REPORT OF RESULTS

PROJECT AF 61-2

EASTERN PACIFIC SURVEY

VOL. IV

15 JUNE 1963

1370TH PHOTO-MAPPING WING

AIR PHOTOGRAPHIC & CHARTING SERVICE (MATS)

FINAL REPORT

HAWAIIAN GRAVITY SURVEY

MARCH 1963

Prepared by
Data Reduction Division

APPROVED:

HARRY G. PETERSON, Colonel, USAF
Commander

1381ST GEODETIC SURVEY SQUADRON (MISSILE)
AIR PHOTOGRAPHIC AND CHARTING SERVICE
UNITED STATES AIR FORCE
Orlando Air Force Base, Florida

ABSTRACT

This report contains computations and results for the gravity survey accomplished by the 1381st Geodetic Survey Squadron (Missile) in support of the Hawaiian HIRAN Project, AF 61-2. The gravity work includes base station surveys and observations along level lines. The base station to which all final data is referred is the MATS terminal base station located at Hickam AFB, Hawaii. To obtain gravity values referred to the first order pendulum station in the Bishop Museum, subtract 0.9 mgals from the values contained in this report.

TABLE OF CONTENTS

INTRODUCTION

The gravity survey covered in this report was undertaken to obtain gravity data along and in the vicinity of the Hawaiian Island chain using transportation on an availability basis from the Hawaiian HIRAN Project, 61-2. The data acquired by the 1381st Geodetic Survey Squadron (Missile) in the Hawaiian area will in time contribute to the determination of geoid undulations in the area. Gravity base stations were established or reoccupied on the islands of Kure, Midway, Johnston, Lisianski, Laysan, French Frigate Shoals, Lanai, Oahu, Molokai, Maui, Kauai, and Hawaii; in addition, gravity observations were made along the USGS level lines on the last four islands. The stations observed are shown in figures 1 and 2, and the main loop schemes are given in figures 3-8.

All gravity survey data acquired during the project was reduced by the 1381st GSS(M).

The gravity survey program and specifications were prepared by the Air Photographic and Charting Service (APCS) and are contained in Addendum Nr. 1 to APCS OPLAN 502-61, dated 22 June 1961.

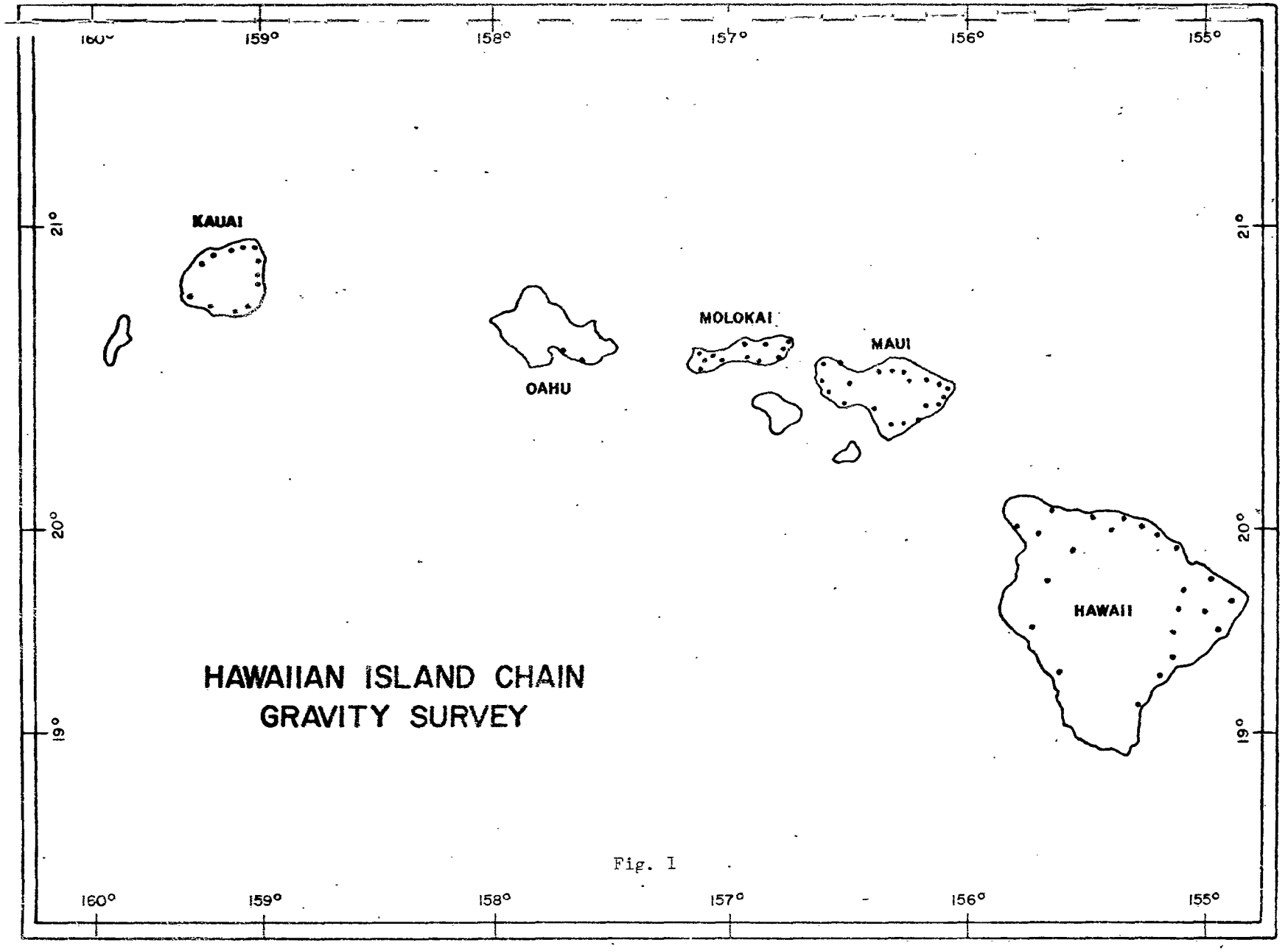

160°
159°
158°
157°
156°
155°
21°
20°
19°
KAUAI
OAHU
MOLOKAI
MAUI
HAWAII
HAWAIIAN ISLAND CHAIN
GRAVITY SURVEY

Fig. I

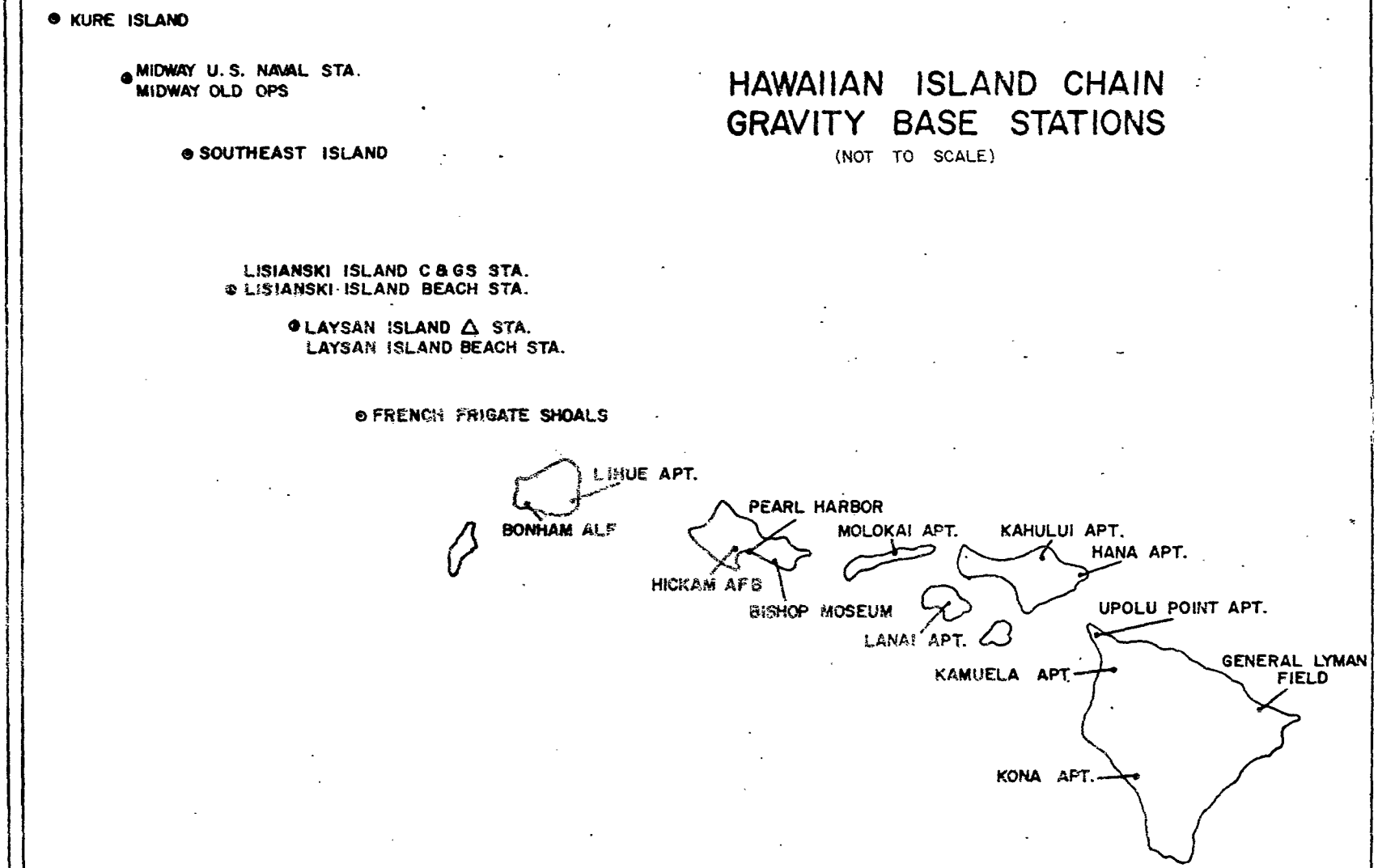

KURE ISLAND
MIDWAY U. S. NAVAL STA.
MIDWAY OLD OPS
SOUTHEAST ISLAND
HAWAIIAN ISLAND CHAIN
GRAVITY BASE STATIONS
(NOT TO SCALE)
LISIANSKI ISLAND C & GS STA.
LISIANSKI ISLAND BEACH STA.
LAYSAN ISLAND △ STA.
LAYSAN ISLAND BEACH STA.
FRENCH FRIGATE SHOALS
LIHUE APT.
BONHAM ALF
PEARL HARBOR
HICKAM AFB
BISHOP MOSEUM
MOLOKAI APT.
KAHULUI APT.
HANA APT.
LANAI APT.
UPOLU POINT APT.
KAMUELA APT.
GENERAL LYMAN FIELD
KONA APT.
JOHNSTON ISLAND

Fig. 2

1381ST GSS (M)

GRAVITY PROJECT SKETCH

Project: Hawaiian Base Station Survey Area: Hawaiian Islands

Dates: 1 July 1961 to 23 August 1961

Existing Gravity Station

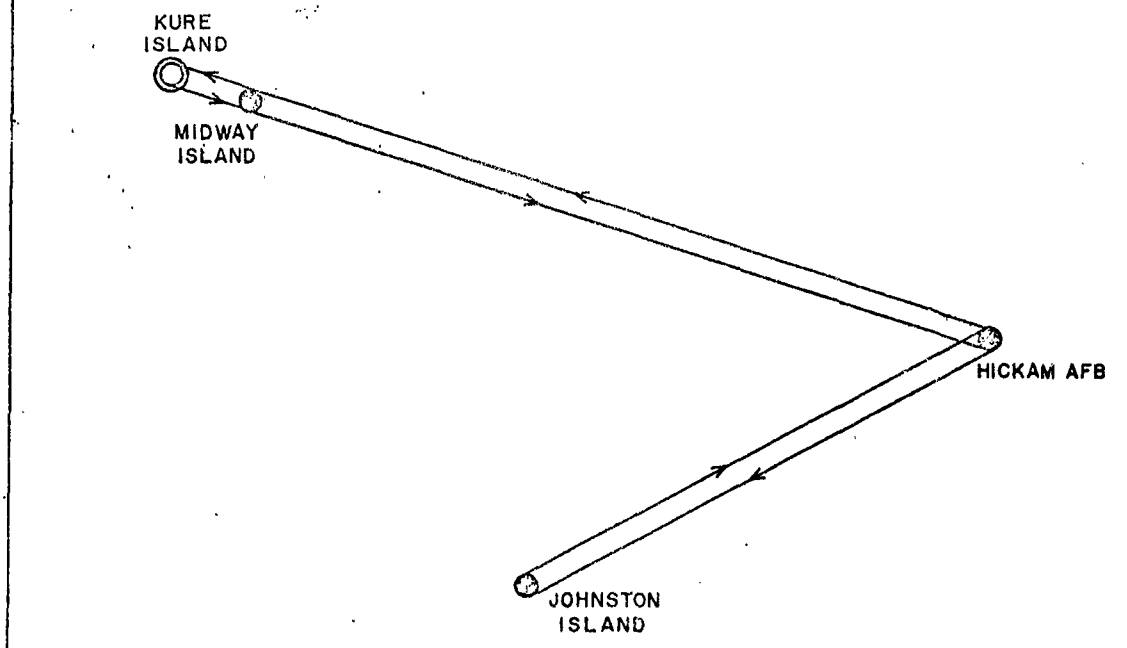
Gravity Station to be Established

New Gravity Station

Sequence of Loop Observations

SKETCH

Worden Master 615 & 617



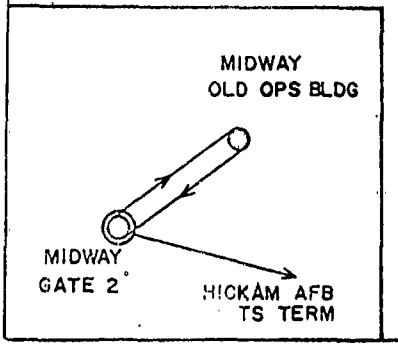


Fig. 3

1381ST GSS (M)

GRAVITY PROJECT SKETCH

Project: Hawaiian Base Station Survey Area: Hawaiian Islands

Dates: 1 July 1961 to 23 August 1961

Existing Gravity Station

Gravity Station to be Established

New Gravity Station

Sequence of Loop Observations

SKETCH

Worden Master 615 & 617

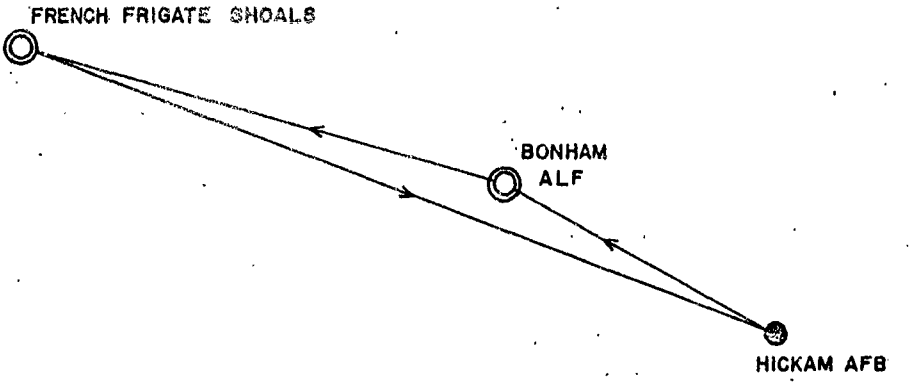


Fig. 4

1381ST GSS (M)

GRAVITY PROJECT SKETCH

Project: Hawaiian Base Station Survey Area: Hawaiian Islands

Dates: 1 July 1961 to 23 August 1961

Existing Gravity Station

Gravity Station to be Established

New Gravity Station

Sequence of Loop Observations

SKETCH

Worden Master 615 & 617

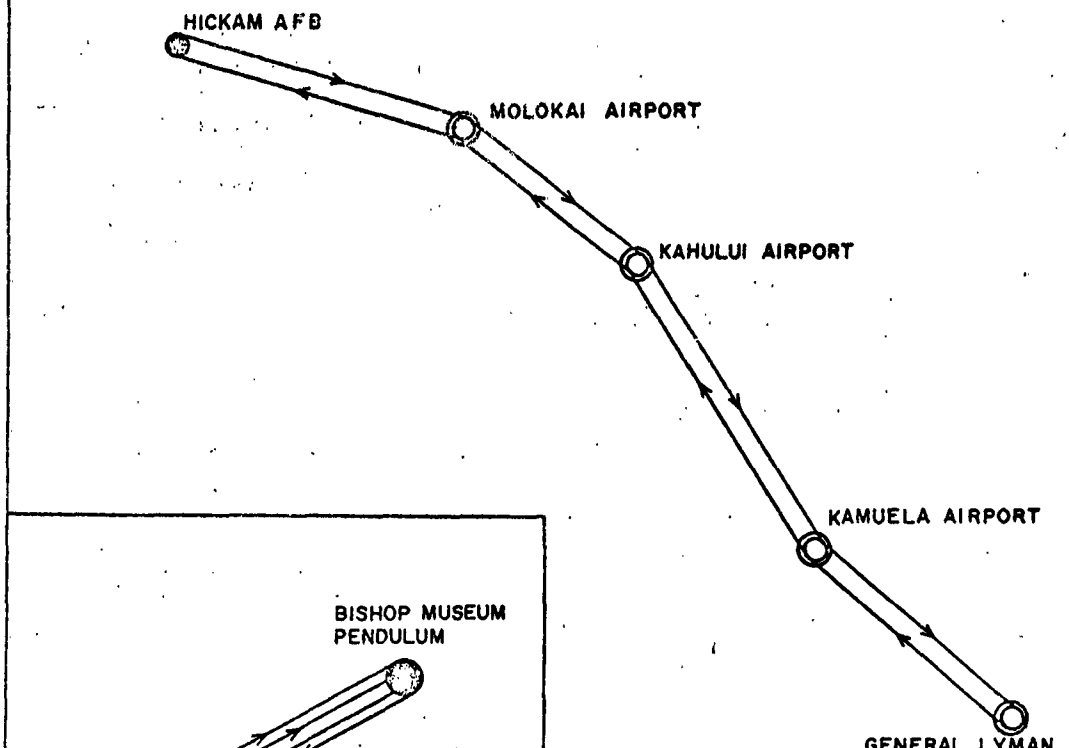


Fig. 5

1381ST GSS (M)

GRAVITY PROJECT SKETCH

Project: Hawaiian Base Station Survey Area: Hawaiian Islands

Dates: 1 July 1961 to 23 August 1961

Existing Gravity Station

Gravity Station to be Established

New Gravity Station

Sequence of Loop Observations

SKETCH Worden Master 615 & 617

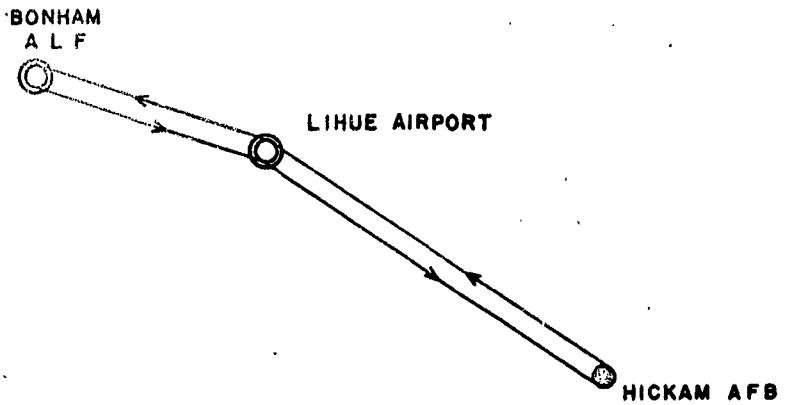


Fig. 6

1381ST GSS (M)

GRAVITY PROJECT SKETCH

Project: Hawaiian Base Station Survey Area: Hawaiian Islands

Dates: 1 July 1961 to 23 August 1961

Existing Gravity Station

Gravity Station to be Established

New Gravity Station

Sequence of Loop Observations

SKETCH Worden Master 615 & 617

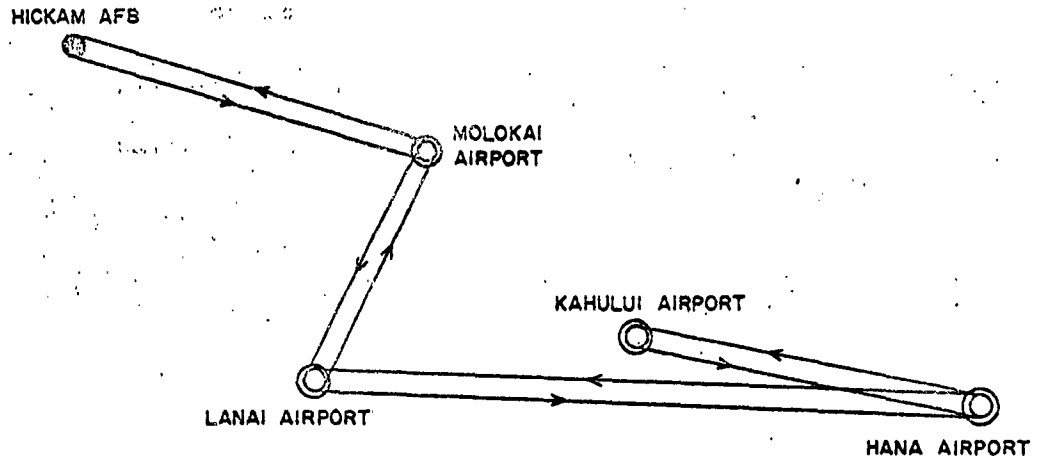


Fig. 7

1381ST GSS (M)

GRAVITY PROJECT SKETCH

Project: Hawaiian Base Station Survey Area: Hawaiian Islands

Dates: 1 July 1961 to 23 August 1961

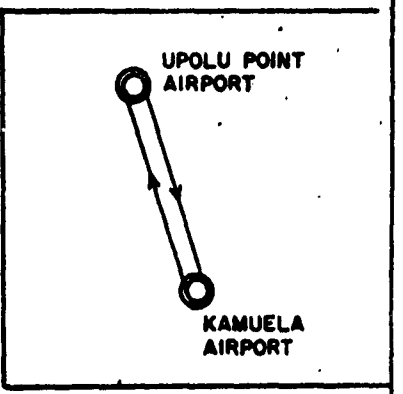
Existing Gravity Station

Gravity Station to be Established

New Gravity Station

Sequence of Loop Observations

SKETCH Worden Master 615 & 617



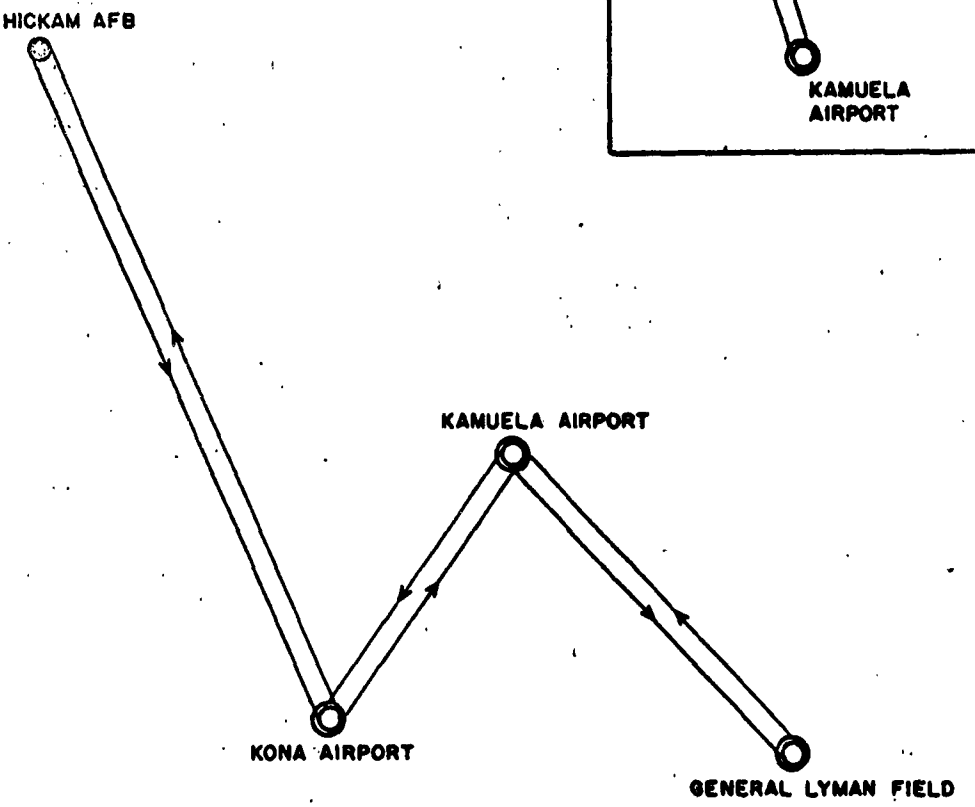


Fig. 8

INSTRUMENTS

Two Worden Master gravity meters were used for the survey. These instruments, numbered 615 and 617, are of the unstable type and have a three piece quartz spring element. Each instrument has a single dial of 2200 dial units range or over 1500 mgals without reset. The effects of temperature on instrument drift variability and rate is minimized by means of the insulating vacuum flask protecting the instrument, the temperature variation compensation system, and the low powered temperature stabilization system which provides actual temperature control. The quartz spring element is sealed in partial vacuum (about seven mm) for protection against contamination and to minimize the effects of changing atmospheric pressure. The weight of an instrument with its carrying case, battery charger and other associated equipment is about 25 pounds.

Instrument calibration and linearity of instrument drift are discussed in the Computations Section.

SPECIFICATIONS

The following specifications for the gravity survey were extracted from Annex Alfa of Addendum Nr. 1 to APCS OPLAN 502-61, dated 22 June 1961:

1. Second-order gravity base stations will be established with an accuracy of 0.5 milligal relative to the first-order gravity base located in Bishop Museum, in Honolulu, Hawaii.

2. Gravity meters used in this work will be calibrated before and after the field survey over appropriate base stations of the North American Calibration Range.

3. Second-Order gravity base stations will be described on 1381st Form 23, of March 61. (See Tab A, Appendix II)

4. Regional gravity stations will be established on previously described level bench marks and will be tied to the second-order gravity base network to an accuracy of 0.5 milligal. In general, these stations will be established at intervals of five miles along the existing level lines in areas where existing gravity data is inadequate for regional coverage.

5. Elevations of second-order and regional gravity stations will be determined to an accuracy of $\pm$ 10 feet with reference to mean sea level. This is a minimum requirement for accuracy, the maximum useful accuracy is $\pm$ 1 foot.

6. Geographic coordinates for gravity stations will be scaled from existing maps. Desirable accuracy for these coordinates is $\pm$ 0.1 minute of arc.

SURVEY OPERATIONS

The Hawaiian area gravity survey was accomplished during the period July - August 1961. The order of survey and mode of transportation were Laysan Island, Lisianski, Southeast Island, Midway, French Frigate Shoals and Johnston Island using LST and aircraft transportation; airport bases in the Hawaiian area, Kure and Midway Islands using aircraft transportation; and regional surveys of

Kauai, Molokai, Maui and Hawaii using jeep transportation. Closures obtained may be seen from the loop computations in appendix B and are discussed in the computation section of the report. The loop base stations used for the Hawaiian project were: Hickam AFB, Molokai, Kahului, and Kanuela Airports.

The gravity stations established along level lines at 5 to 10 mile intervals were referenced to the base stations established in the survey. The descriptions for many of the benchmarks recovered and used are contained in the USGS Bulletin 561, "Results of Spirit Leveling in Hawaii, 1910-1913".

COMPUTATIONS

Total instrument travel drift was taken to be the loop closure obtained after correcting observations for non travel drift and tidal effects. Travel drift corrections for each observation were then obtained by prorating the above loop closures on the basis of elapsed travel time of observation from the loop base station. With the exception of a Hickam AFB to Midway loop which took over a week to complete and had a closure of - 2.53 mgals, the longest travel time spent on a loop was slightly less than a day. The maximum closure obtained, again excluding the Hickam - Midway loop, was - 1.22 mgals. The average travel time for loop completion was about eight hours and average closure without regard to sign was 0.20 mgals.

The "Tidal Gravity Effect Tables" published by the Houston Technical Laboratories were used to determine and remove the effect of the attraction of the sun and moon on the gravity measurements. After correcting for tidal effects, drift during stops or delays and drift during travel, gravity differences between each station and the loop base station were computed.

The table of dial factors which was used for Worden Master gravity meter 617 and the single factor used for 615 are given in Appendix A. The single dial factor for 615 resulted from a calibration against a number of Professor Woollard's airport gravity base values in the United States.[1] The dial factors for 617 were determined from instrument measurements taken at sites between Key West, Florida and Charleston, South Carolina which were established with a prospecting type Worden Master gravity meter. The resulting dial factors were then corrected for scale error using data from observations made at stations established by the University of Wisconsin.[2] The Wisconsin stations used were Orlando, Atlanta, Chattanooga, Washington, Philadelphia, McGuire AFB, and Jacksonville.

Subsequent recalibration computations based on observations over an extended range from Bogota, Colombia to Hanscom Field, Massachusetts has produced scale changes in the dial factors used for the Hawaiian project of less than 1 part in 3000 for 617 and essentially no change for 615.[3] The loop computations were not redone using the new calibration data since changes in the final values would have been of the order of 0.1 mgals or less.

To supply additional data from which an assessment of the quality of the survey data could be made a least squares straight line adjustment of 13 observations at Hickam AFB was made. These observations, made during the period 6 July to 7 August 1961, exhibited a near linear drift rate. For instrument 615 a drift rate of 0.5307 $\pm$ 0.0047 mgals per day was determined. The mean residual (departure of observations from a straight line) taken without regard to sign was less than 0.1 mgals for the 13 observations. The drift rate for 617 was determined to be 0.3360 $\pm$ 0.0029 with a mean residual of less than 0.1 mgals.

These results were very encouraging from the standpoint of justification of linear removal of drift with respect to time and have prompted reconsideration of the necessity of completing loops in minimum time. The gravity values (differences with respect to Hickam AFB) computed from the least squares drift rate were compared with the values computed by the conventional loop computation (Appendix B) and the results are tabulated in Appendix A. The average difference without regard to sign between mean values from the two methods was only 0.04 mgals. The agreement between instruments without regard to sign for observations taken during the 6 July to 7 August period was 0.14 mgals for the loop computation method and 0.15 mgals for the least squares drift rate method. The above insignificant difference between average agreements indicates that the two methods are of comparable validity. With the least squares drift rate method, the larger differences were obtained for the observations at higher elevation indicating that temperature and pressure changes affected the instrument readings. Since pressure and temperature response characteristics

of the instrument can be determined and compensated for[4], the least squares drift rate method may yield a greater degree of consistency and reliability for the computed data.

ABSTRACTS OF GRAVITY DATA

All gravity values given in this report are referred to the Hickam AFB station whose gravity meter Potsdam system value is 978,933.7 mgals. Based on this value at Hickam AFB a gravity meter value for the first order station at the Bishop Museum of 978,952.9 mgals was determined which differed from the Wisconsin gravity meter value by 0.1 mgals. The Wisconsin pendulum value for the Bishop Museum is 978,952.0[2], therefore, if gravity results referred to the pendulum value are desired a - 0.9 mgal correction must be made to the values given in this report.

Horizontal and vertical positions, their source, and estimates of their accuracy are contained in the base station descriptions given in Appendix C.

ACCURACY OF RESULTS

The average agreement between instruments of $\pm$ 0.2 mgals, the agreement of observations from different loops at common sites, the verification of dial factors used through subsequent recalibration computations, the small residuals obtained in the least squares drift rate computation and the loop closures obtained indicate an accuracy better than the 0.5 mgals specified for the survey. Comparisons between the survey results and University of Wisconsin values at common stations (Appendix A) produced a maximum difference of 0.3 mgals and a scale difference of about 1 part in 1500.

CONCLUSIONS

The completed Hawaiian gravity survey has satisfied the specifications given in this report with the exception of the calibration of instruments on the North American line before and after the survey. This exception was due to the fact that transportation availability and other gravity survey project considerations caused the East Coast Calibration line (ECCL)[3] to be used instead of the North American. After the North American, East Coast and other gravity meter calibration lines located throughout the world are interrelated and a world calibration standard is adopted, the Hawaiian survey could be recomputed if the ECCL is changed significantly, however, present data indicates a relatively close agreement between the ECCL and other calibration lines which should make changes in the ECCL based on the adoption of a uniform calibration standard very small.

A Network of 21 base stations was established throughout the Hawaiian Island chain to an accuracy of $\pm$ 0.5 mgals relative to the Hickam AFB or Bishop Museum site. A total of 67 gravity stations have been established along level lines on the Islands of Hawaii, Molokai, Maui and Kanai to contribute to regional coverage of the area. The accuracy of these stations with respect to Hickam AFB Bishop Museum is also estimated to be $\pm$ 0.5 mgals.

The least squares drift rate method of determining final gravity values appears to be well suited for computation of regional type surveys where a large number of observations are involved. It appears that loop survey completion time can be increased to several days or even a week without a significant decrease in accuracy of the

gravity values established in a regional survey. The computational procedure is considerably simplified and gravity values can be more readily determined using the least squares method. Where greater accuracy is desired with this or any other computational method, the pressure and temperature response characteristics can be determined and appropriate corrections made.

SECURITY CLASSIFICATION

All data given in this report is unclassified in accordance with Addendum Nr. 1 to APCS OPLAN 502-61, dated 22 June 1961.

REFERENCES

1. Woollard, G. P., "Results for a Gravity Control Network at Airports in the United States", Geophysics, Vol. XXII, No. 3, July 1958.

2. Woollard, G. P., and Rose J. C., "Final Report on Gravity Program", Reference No. 60-26, Woods Hole Oceanographic Institution, 1960.

3. Whalen, C. T., and Lofaro, R. J., "The East Coast Gravity Meter Calibration Line", presented at 1962 St. Louis ACSM-ASP Meeting, September 1962.

4. Woollard, G. P., Longfield, R., and Carlson, B., "Gravity Standardization Studies, Final Report", Reference No. 62-23, Woods Hole Oceanographic Institution, 1962.

APPENDIX A

TABULATED DATA

1. Abstract of Gravity
2. Comparison of Wisconsin and 1381st GSS(M) Data
3. Table of Dial Factors
4. Least Squares Adjustment of Gravity Observations
5. Gravity Difference Comparison: Loop Versus Single Drift Rate
6. Mean Gravity Difference Comparison: Loop Versus Single Drift Rate

1381st Geodetic Survey Squadron (Missile)
AIR PHOTOGRAPHIC AND CHARTING SERVICE
UNITED STATES AIR FORCE
Orlando Air Force Base, Florida

PROJECT APCS 502-61

ABSTRACT OF GRAVITY DATA

	Inst. 615		Inst. 617		
STATION	ΔG Mgals	Observed Gravity	ΔG Mgals	Observed Gravity	Mean Gravity
Hickam MATS Term.	Base	978,933.7	Base	978,933.7	978,933.7
Molokai Airport	+25.8	959.5	+25.8	959.5	959.5
Kualapuu USGS BM "878"	-17.4	916.3	-17.3	916.4	916.4
Kalaupapa Lookout	-81.3	852.4	-81.1	852.6	852.5
Kaunakakai USGS BM	+25.2	958.9	+25.2	958.9	958.9
Hwy 45 Bridge	+16.6	950.3	+16.6	950.3	950.3
Kamalo USGS BM "39"	+15.9	949.6	+16.1	949.8	949.7
Pukoo Fishpond	+19.5	953.2	+19.4	953.1	953.2
Kanaha Point USGS BM "48"	+21.7	955.4	+21.8	955.5	955.4
Halawa USGS BM "25"	+29.1	962.8	+29.2	962.9	962.8
Puunana Reservoir USGS BM	-35.6	898.1	-35.5	898.2	898.2
Maunaloa USGS BM "1102"	-28.0	905.7	-27.7	906.0	905.8
Waieli Trian. Sta.	-5.9	927.8	-5.8	927.9	927.8
Kaeo Trian. Sta.	-14.7	919.0	-14.6	919.1	919.0
Lanai Airport	-85.8	847.9	-85.5	848.2	848.0
Hana Airport	-2.5	931.2	- 2.7	931.0	931.0
Kahului Airport	-44.1	889.6	-44.1	889.6	889.6
Kahakuloa USGS BM	-37.6	896.1	-37.7	896.0	896.0
Honokowai Hwy 30	-29.7	904.0	-29.7	904.0	904.0
Lahaina USGS	-35.9	897.8	-35.8	897.9	897.8
Olowalu Bridge	-36.1	897.6	-36.1	897.6	897.6
Intersection Hwy 30 & Hwy 31	-47.3	886.4	-47.3	886.4	886.4
Wailuku Courthouse	-51.4	882.3	-51.3	882.4	882.4
Hwy 37 Makena Junction Hwy 31	-155.2	778.5	-154.9	778.8	778.6
Kepuni Bridge			-93.1	840.6	840.6
Puu Maneoneo Trian. Sta.	-62.5	871.2	-62.7	871.0	871.1
Kipahulu USGS BM 192	-34.4	899.3	-34.6	899.1	899.2
Muolea USGS BM 335	-28.0	905.7	-28.2	905.5	905.6
Nahiku USGS BM 44-M-1923 on Bridge	-61.5	872.2	-61.5	872.2	872.2
Koolau Ditch Intake	-88.7	845.0	-88.6	845.1	845.0

STATION	Inst. 615 ΔG Mgals	Inst. 615 Observed Gravity	Inst. 617 ΔG Mgals	Inst. 617 Observed Gravity	Mean Gravity
Kailua USGS BM M-11-1923	-64.1	978,869.6	-64.0	978,869.7	978,869.6
Haiku USGS BM	-56.1	877.6	-56.2	877.5	877.6
Makawao USGS BM	-122.8	810.9	-122.5	811.2	811.0
Upper Paia USC&GS BM	-49.3	884.4	-49.1	884.6	884.5
Kihei USC&GS BM	-37.5	896.2	-37.5	896.2	896.2
Haleakala Crater	-634.7	299.0	-634.0	299.7	299.4
Haleakala USC&GS Trian. Sta.Kolekole	-662.0	889.6	-661.2	228.4	228.0
Kona Airport	-84.8	848.9	-84.6	849.1	849.0
Kamulela Airport	-160.8	772.9	-160.2	773.5	773.2
Bishop Museum	+19.2	952.9	+19.2	952.9	952.9
Hilo Gen.Lyman Field	+102.3	875.5	+102.0	875.2	875.4
Hwy 19 S. of Pepeekeo Jct	+95.5	868.7	+95.3	868.5	868.6
Nanue Bridge	+127.6	900.8	+127.2	900.4	900.6
Kilau Bridge	+111.7	884.9	+111.4	884.6	884.8
Wapunahina Bridge	+104.3	877.5	+104.0	877.2	877.4
Honokaa	+83.9	857.1	+83.7	856.9	857.0
Kukuihaele	+110.7	883.9	+110.5	883.7	883.8
Waimea	-32.4	740.8	-32.4	740.8	740.8
Upolu Airport	+102.5	875.7	+102.2	875.4	875.6
Manukona Landing	+97.0	870.2	+96.7	869.9	870.0
Halawa	+112.0	885.2	+111.8	885.0	885.1
Makahuna Bridge	+123.3	896.5	+122.8	896.0	896.2
Keaau	+85.8	859.0	+85.6	858.8	858.9
Pahoa	+78.4	851.6	+78.3	851.5	851.6
Kalapana	+93.9	867.1	+93.6	866.8	867.0
Pohoki	+99.0	872.2	+99.0	872.2	872.2
Pahala	+25.4	798.6	+25.4	798.6	798.6
Hilea	+73.3	846.5	+73.2	846.4	846.4
Naalehu	+44.0	817.2	+43.9	817.1	817.2
Kealakekua	+0.7	773.9	+0.7	773.9	773.9
Puuanahulu	-58.4	714.8	-58.2	715.0	714.9
Auwaiakeakua Bridge	-50.3	722.9	-50.3	722.9	722.9
Waikii	-172.3	600.9	-172.2	601.0	601.0
USGS BM Hwy 2.8 miles S. of Mtn View	-15.7	757.5	-15.6	757.6	757.6
Volcano House	-102.1	671.1	-101.9	671.3	671.2
Hwy 11 USGS BM 3640	-84.8	688.4	-84.8	688.4	688.4
Lihue Airport	+103.9	979,037.6	+103.8	979,037.5	979,037.6
K-1 Bridge	+73.4	007.1	+73.2	006.9	007.0
Kalahed USGS BM 700	+43.2	978,976.9	+43.2	978,976.9	978,976.9
Port Allen USGS BM 35	+70.8	979,004.5	+70.6	979,004.3	979,004.4
Waimea USGS BM 9	+87.5	021.2	+87.1	020.8	021.0
Wailua Bridge	+127.4	061.1	+127.2	060.9	061.0
Kapaa Armory	+124.4	058.1	+124.2	057.9	058.0
Kahala Point Light House	+116.3	050.0	+116.1	049.8	049.9

STATION	Inst. 615 ΔG Mgals	Inst. 615 Observed Gravity	Inst. 617 ΔG Mgals	Inst. 617 Observed Gravity	Mean Gravity
Koolau School	+110.6	979,044.3	+110.3	979,044.0	979,044.2
Kilauea Tele. Exc.	+111.0	044.7	+110.8	044.5	044.6
Hanalei Bridge USGS BM 17	+136.5	070.2	+136.2	069.9	070.0
Wainiha Power House USGS BM 101	+139.7	073.4	+139.6	073.3	073.4
Kokee 109 AC&W Sta	-166.1	978,767.6	-165.6	978,768.1	978,767.8
Midway Gate 2	+560.94	979,494.6	+561.03	979,494.7	979,494.6
Kure Island	+606.04	539.7	+606.02	539.7	539.7
Midway Old Ops.	+565.28	499.0	+565.37	499.1	499.0
Johnson Island	-214.09	978,719.6	-214.10	978,719.6	978,719.6
A.L.F. Bonham	+120.90	979,054.6	+120.87	979,054.6	979,054.6
French Frigate Shoals	+246.16	179.9	+246.01	179.7	179.8
Pearl Harbor Berth M-3	+04.8	978,938.5	+04.9	978,938.6	978,938.6
Laysan Island Top of Beach	+369.1	979,302.8	+369.1	979,302.8	979,302.8
Laysan Island Triam. Sta.	+368.4	302.1	+368.5	302.2	302.2
Lisiawski Is. C&GS Sta.	+421.7	355.4	+421.7	355.4	355.4
Lisiawski Is. Top of Beach	+422.8	356.5	+422.9	356.6	356.6
Southeast Is. Pearl & Hermes	+510.3	444.0	+510.2	443.9	444.0

1381st Geodetic Survey Squadron (Missile)
AIR PHOTOGRAPHIC AND CHARTING SERVICE
UNITED STATES AIR FORCE
Orlando Air Force Base, Florida

COMPARISON OF 1381ST GSS(M) AND UNIVERSITY OF WISCONSIN VALUES AT COMMON SITES

STATION	University of Wisconsin Mgals	1381st Mgals	Difference Mgals
Hickam AFB	978,933.7	978,933.7	
Bishop Museum	978,953.0	978,952.9	+0.1
Johnston Island	978,719.8	978,719.6	+0.2
Midway Island	978,499.3	978,499.0	+0.3

TABLE OF DIAL FACTORS AND GRAVITY VALUES PER TURN FOR WORDEN MASTER GRAVITY METERS

DIAL TURNS	No. 616 DIAL FACTOR	No. 616 MGAL VALUE	No. 617 DIAL FACTOR	No. 617 MGAL VALUE
0	.6932	0.00	.6934	0.00
1	.6921	69.32	.6943	69.34
2	.6905	138.53	.6946	138.77
3	.6899	207.58	.6944	208.23
4	.6906	276.57	.6938	277.67
5	.6919	345.63	.6936	347.05
6	.6925	414.82	.6934	416.41
7	.6921	484.07	.6937	485.75
8	.6911	553.28	.6943	555.12
9	.6911	622.39	.6948	624.55
10	.6921	691.50	.6950	694.03
11	.6928	760.71	.6945	763.53
12	.6920	829.99	.6937	832.98
13	.6905	899.19	.6929	902.35
14	.6893	968.24	.6925	971.64
15	.6897	1,037.17	.6927	1,040.89
16	.6911	1,106.14	.6933	1,110.16
17	.6923	1,175.25	.6942	1,179.49
18	.6921	1,244.48	.6944	1,248.91
19	.6914	1,313.69	.6944	1,318.35
20	.6918	1,382.83	.6940	1,387.79
21	.6929	1,452.01	.6934	1,457.19
22		1,521.30		1,526,53

A single factor of 0.69594 will be used for Instrument No. 615

Dial factors were determined from the results of the Key West - Charleston Line, based on the factory tilt table calibration of Worden Master No. 545. These dial factors (and mgal values) were then corrected - 3.62 mgals/1000 mgals for No. 616 and -3.12 mgals/1000 mgals for No. 617 based on a least square straight line fit of results of the 6 October - 16 November 1960 trip over stations Orlando-1, Atlanta, Chattanooga, Washington D.C. Airport, Philadelphia, McGuire and Jacksonville, to W.H.O.I. results for these same stations published in their "Final Report on Gravity Program" Ref. No. 60-26, July 1960.

Computed by: C. T. Whalen, 9 June 1961
Checked by: W. H. Radtke, 12 June 1961
Copy Checked by: C. T. Whalen, 12 June 1961

LEAST SQUARES ADJUSTMENT OF GRAVITY METER OBSERVATIONS

STATION NAME AND NUMBER	(1) STANDARD GRAVITY VALUES (MGALS)	(2) INST. 615 OBS. GRAVITY (MGALS)	(3) Day and Month	(4) Hours	(5) Y (1)-(2) (MGALS)	(6) Y^2	(7) X (Days)	(8) X^2	(9) XY	(10) Corr. to(2) = mx + b (MGALS)	(11) (MGALS)	(12) (10)-(5) (MGALS)
Hickam AFB	329.40	329.40	6 Jul	00.68	0	+	6.0275			+ 0.050		+.050
		334.50	15 Jul	06.10	+ 5.10	+	15.2543			+ 4.948		-.152
		336.40	18 Jul	19.90	+ 7.00	+	18.8293			+ 6.845		-.155
		337.45	21 Jul	02.33	+ 8.05	+	21.0973			+ 8.048		-.002
		338.16	22 Jul	15.77	+ 8.76	+	22.6573			+ 8.876		+.116
		338.55	23 Jul	06.80	+ 9.15	+	23.2833			+ 9.209		+.059
		339.29	24 Jul	16.68	+ 9.89	+	24.6953			+ 9.958		+.068
		339.54	25 Jul	02.87	+10.14	+	25.1193			+10.183		+.043
		342.03	29 Jul	18.83	+12.63	+	29.7843			+12.659		+.029
		342.16	30 Jul	01.62	+12.76	+	30.0673			+12.809		+.049
		342.87	31 Jul	16.72	+13.47	+	31.6963			+13.673		+.203
		344.71	3 Aug	04.70	+15.31	+	34.1963			+15.000		-.310
		346.79	7 Aug	16.80	+17.39	+	38.7003			+17.390		.000
				ΣP	ΣPY	ΣPY^2	ΣPX	ΣPX^2	ΣPXY			ΣPV^2
	SUMS			13 +	129.65	+1541.	+321.	+8827.	+3673.			+2.2136
						4879	4081	8681	2288			

SET P = 1 for Largest σ

$$\frac{\sigma_1^2}{\sigma_2^2} = \frac{P_2}{P_1}$$

$$\mu = \pm\sqrt{\frac{\Sigma PV^2}{n-2}} = +.1393 \text{ mgals}$$

$$\sigma_b = \pm\mu\sqrt{[aa]} = +.1223 \text{ mgals}$$

$$\sigma_m = \pm\mu\sqrt{[\beta\beta]} = +.0047 \frac{\text{mgals}}{\text{gal}}$$

$$b = \frac{(\Sigma PY)(\Sigma PX^2)-(\Sigma PXY)(\Sigma PX)}{(\Sigma P)(\Sigma PX^2)-(\Sigma PX)^2} = -3.1479 \text{ mgals}$$

$$m = \frac{(\Sigma P)(\Sigma PXY)-(\Sigma PX)(\Sigma PY)}{(\Sigma P)(\Sigma PX^2)-(\Sigma PX)^2} = +0.5307 \frac{\text{mgals}}{\text{gal}}$$

$$[aa] = \frac{1}{(\Sigma P)} + \frac{\frac{(\Sigma PX)^2}{(\Sigma P)^2}}{(\Sigma PX^2) - \frac{(\Sigma PX)^2}{(\Sigma P)}} = +0.7704$$

$$[\beta\beta] = \frac{1}{(\Sigma PX^2) - \frac{(\Sigma PX)^2}{(\Sigma P)}} = +0.001134 \frac{1}{\text{gals}^2}$$

COMPUTED BY: Zawisza

DATE: 24 Apr 63

CHECKED BY: Stinnette

DATE: 24 Apr 63

LEAST SQUARES ADJUSMENT OF GRAVITY METER OBSERVATIONS

STATION NAME AND NUMBER	(1) STANDARD GRAVITY VALUES (MGALS)	(2) INST. 617 OBS. GRAVITY (MGALS)	(3) Day and Month	(4) Hours	(5) Y (1)-(2) (MGALS)	(6) Y^2	(7) X (Days)	(8) X^2	(9) XY	(10) Corr. to(2) = mx + b (MGALS)	(11) (2) + (10) (MGALS)	(12) (10)-(5) (MGALS)
Hickam AFB	325.16	325.16	6 Jul	00.68	0		6.0275			- 0.012		-0.012
		328.36	15 Jul	06.10	+ 3.20		15.2543			+ 3.088		-0.112
		329.48	18 Jul	19.90	+ 4.32		18.8293			+ 4.288		-0.032
		330.21	21 Jul	02.33	+ 5.05		21.0973			+ 5.050		0.000
		330.64	22 Jul	15.77	+ 5.48		22.6573			+ 5.574		+0.094
		330.86	23 Jul	06.80	+ 5.70		23.2833			+ 5.785		+0.085
		331.25	24 Jul	16.68	+ 6.09		24.6953			+ 6.259		+0.169
		331.62	25 Jul	02.87	+ 6.46		25.1193			+ 6.401		-0.059
		333.22	29 Jul	18.83	+ 8.06		29.7843			+ 7.968		-0.092
		333.21	30 Jul	01.62	+ 8.05		30.0673			+ 8.063		+0.013
		333.73	31 Jul	16.72	+ 8.57		31.6963			+ 8.610		+0.040
		334.71	3 Aug	04.60	+ 9.55		34.1963			+ 9.450		-0.100
↓	↓	336.13	7 Aug	16.82	+10.97		38.7003			+10.963		-0.007
				ΣP	ΣY	ΣY^2	ΣX	ΣX^2	ΣXY			Σv^2
	SUMS			13	+81.50		321.4081	8827. 8681	2311. 097			+0.082097

SET P = 1 for Largest σ

$$\frac{\sigma_1^2}{\sigma_2^2} = \frac{P_2}{P_1}$$

$$\sigma = \pm\sqrt{\frac{\Sigma v^2}{n-2}} = \pm 0.0864 \text{ mgals.}$$

$$\sigma_b = \pm\sigma\sqrt{[aa]} = \pm 0.0758 \text{ mgals.}$$

$$\sigma_m = \pm\sigma\sqrt{[pB]} = \pm 0.0029 \frac{\text{mgals}}{\text{gal}}$$

$$b = \frac{(\Sigma Y)(\Sigma X^2)-(\Sigma XY)(\Sigma X)}{(\Sigma P)(\Sigma X^2)-(\Sigma X)^2} = -2.0363 \text{ mgals}$$

$$m = \frac{(\Sigma P)(\Sigma XY)-(\Sigma X)(\Sigma Y)}{(\Sigma P)(\Sigma X^2)-(\Sigma X)^2} = +0.3359 \frac{\text{mgals}}{\text{gal}}$$

$$[aa] = \frac{1}{(\Sigma P)} + \frac{\frac{(\Sigma X)^2}{(\Sigma P)^2}}{(\Sigma X^2) - \frac{(\Sigma X)^2}{(\Sigma P)}} = +0.7704$$

$$[pB] = \frac{1}{(\Sigma X^2) - \frac{(\Sigma X)^2}{(\Sigma P)}} = +0.001134 \frac{1}{\text{gals}^2}$$

COMPUTED BY: Zawisza

DATE: 24 Apr 63

CHECKED BY: Stinnette

DATE: 24 Apr 63

1381st Ha FORM AGO 44 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

GRAVITY DIFFERENCE COMPARISON: LOOP VERSUS SINGLE DRIFT RATE
INSTRUMENT 615

Station	Date & Hour	Days from First Obs	ΔG From Loop Comps	ΔG From Single Drift	MGAL Differences
Pearl Harbor	6 Jul 61 01.60	0.0383	+4.80	+4.75	+0.05
Laysan Beach	10 Jul 61 20.95	4.8446	+369.08	+369.10	-0.02
Laysan Hiran	02.83	6.0896	+368.37	+368.45	-0.08
Lisianski Hiran	21.20	6.8550	+421.73	+421.82	-0.09
Lisianski Beach	21.55	6.8696	+422.80	+422.89	-0.09
Pearl Hermes Hiran	13 Jul 61 23.83	7.9646	+510.28	+510.40	-0.12
Midway Gate 2	14 Jul 61 20.57	8.8288	+561.00	+561.14	-0.14
Midway Gate 2	19 Jul 61 03.08	13.1000	+560.90	+561.00	-0.10
Kure Island	22.42	13.9058	+606.04	+606.21	-0.17
Midway Gate 2	20 Jul 61 04.52	14.1600	+560.96	+561.18	-0.22
Midway Old Ops	18.67	14.7496	+565.28	+565.34	-0.06
Midway Gate 2	18.83	14.7562	+560.96	+561.03	-0.07
Johnson Island	20.77	16.8371	-214.09	-214.17	-0.06
A.L.F. Bonham	24 Jul 61 18.80	18.7550	+120.90	+120.84	+0.06
French Frigate Shoals	21.88	18.8833	+246.16	+246.11	+0.05

Molokai Airport	29 Jul 61 20.00	23.8050	+25.77	+25.74	+0.03
Maui Kahului Airport	20.78	23.8375	-44.25	-44.28	+0.03
Kamuela Airport	21.82	23.8808	-160.86	-160.89	+0.03
Hilo General Lyman Field	22.53	23.9104	-58.38	-58.42	+0.04
Kamuela Airport	23.20	23.9383	-160.82	-160.86	+0.04
Maui Kahului Airport	30 Jul 61 00.00	23.9717	-44.27	-44.28	+0.01
Molokai Airport	00.67	23.9996	+25.71	+25.66	+0.05
Lihue Airport	31 Jul 61 20.08	25.8083	+103.94	+103.82	+0.12
K-1 Bridge	1 Aug 61 20.12	26.8100	+73.30	+73.17	+0.13
Kalaheo U.S.G.S. BM700	21.13	26.8521	+43.17	+43.06	+0.11
Port Allen USGS BM "35"	22.17	26.8954	+70.85	+70.77	+0.08
Waimea USGS BM "9"	23.13	26.9354	+87.49	+87.44	+0.05
Bonham	23.98	26.9708	+120.98	+120.95	+0.03
Waimea USGS BM "9"	2 Aug 61 00.43	26.9896	+87.44	+87.42	+0.02

Port Allen USGS BM "35"	01.20	27.0217	+70.81	+70.81	+00.00
Kalahed USGS BM700	01.57	.0371	+43.23	+43.24	-0.01
K-1 Bridge	01.87	.0496	+73.42	+73.43	-0.01
Lihue Airport Gate 1	02.28	.0667	+104.06	+104.10	-0.04
Wailua Bridge	16.45	.6571	+127.41	+127.39	+0.02
Kapaa Armory	16.65	.6654	+124.39	+124.38	+0.01
Kahal Point Light House	16.98	.6792	+116.29	+116.29	+0.00
Koolau School	17.38	.6958	+110.56	+110.57	-0.01
Kilauea Tele. Ex69	17.65	.7071	+110.98	+110.99	-0.01
USGS BM17 Hanalei Bridge	18.05	.7238	+136.49	+136.52	-0.03
Wainiha BM101 Power House	18.52	.7433	+139.66	+139.70	-0.04
Kilauea Tele Exc.	19.55	.7863	+110.95	+111.01	-.06
Kapaa Armory	20.32	.8183	+124.38	+124.47	-0.09

Kokee 109 AC&W Station	23.92	.9683	-166.07	-165.88	-0.19
Lihue Airport	3 Aug 61 02.12	28.0600	+103.73	+103.97	-0.24

GRAVITY DIFFERENCE COMPARISON: LOOP VERSUS SINGLE DRIFT RATE
INSTRUMENT 617

Station	Date and Hour	Days from First Obs	ΔG From Loop Comps	ΔG From Single Drift	MGAL Differences
Pearl Harbor Berth M-3	6 Jul 61 01.60	0.0383	+4.88	+4.87	+0.01
Laysan Island Top of Beach	20.95	4.8446	+369.11	+369.15	-0.04
Laysan Island Tri. Sta.	12 Jul 61 02.83	6.0896	+368.46	+368.52	-0.06
Lisiawski Is C&GS Sta	21.20	6.8550	+421.67	+421.74	-0.07
Lisiawski Is Top of Beach	21.33	6.8604	+422.86	+422.93	-0.07
South East Is Pearl Herms	13 Jul 61 23.83	7.9646	+510.25	+510.33	-0.08
Midway USN Sta Gate 2 at Term	14 Jul 61 20.57	8.8288	+560.91	+560.99	-0.08
Midway Gate 2	03.08	13.1000	+561.01	+561.00	-0.01
Kure Island	22.42	13.9058	+606.02	+606.02	-0.00

Midway Gate 2	20 Jul 61 04.52	14.1600	+561.04	+561.02	+0.02
Midway Old Ops	18.67	14.7496	+565.37	+565.37	+0.00
Midway Gate 2	18.83	14.7562	+561.03	+561.02	+0.01
Johnson Island	22 Jul 61 20.77	16.8371	-214.10	-214.20	+0.17
A.F.L. Bonham	24 Jul 61 18.80	18.7550	+120.87	+120.73	+0.14
French Frigate Shoals	21.88	18.8883	+246.01	+245.93	+0.08
Molokai Airport	29 Jul 61 20.00	23.8050	+25.70	+25.75	-0.05
Maui Kahului Airport	29 Jul 61 20.78	23.8375	-44.35	-44.39	+0.04
Kamuela Airport	21.82	23.8808	-160.47	-160.44	-0.03
Hilo General Lyman Field	22.53	23.9104	-58.45	-58.44	-0.01
Kamuela Airport	23.20	23.9383	-160.40	-160.40	-0.00
Maui Kahului Airport	30 Jul 61 00.00	23.9717	-44.27	-44.28	+0.01
Molokai Airport	00.67	23.9996	+25.76	+25.73	+0.03
Lihue Airport	31 Jul 61 20.08	25.8083	+103.84	+103.81	+0.03
K-1 Bridge	1 Aug 61 20.12	26.8100	+73.25	+73.20	+0.05

Kalahed USGS BM 700	+43.22	+43.22	0.00
K-1 Bridge	+73.32	+73.32	0.00
Lihue Airport Gate 1	+103.98	+103.95	+0.03
Wailua Bridge	+127.26	+127.29	-0.03
Kapaa Armory	+124.28	+124.30	-0.02
Kahal Point Light House	+116.18	+116.19	-0.01
Koolau Shoal	+110.42	+110.42	-0.0
Kilauea Tele. Exc.	+110.86	+110.87	-0.01
USGS BM17 Hanalei Bridge	+136.36	+136.36	0.00
Wainiha BM 101 Power House	+139.62	+139.61	+0.01
Kamuela Tele.Exc.	+110.88	+110.85	+0.03
Kapaa Armory	+124.37	+124.33	+0.04
Kokee 109 AC&W Sta	-165.74	-165.84	+0.10
Lihue Airport	+103.92	+103.78	+0.14

Hanalei Bridge USGS RM "17"	18.05	.7238	+136.23	+136.20	+0.03
Wainiha Power House BM 101	18.52	.7433	+139.56	+139.54	+0.02
Kilauea Tele. Exc.	19.55	.7863	+110.75	+110.74	+0.01
Kapaa Armory	20.32	.8183	+124.28	+124.27	+0.01
Kokee 109 AC&W Sta	23.92	.9683	-166.02	-165.59	-0.03
Lihue Airport	3 Aug 61 02.02	28.0600	+103.82	+103.87	-0.05

MEAN GRAVITY DIFFERENCE COMPARISON: LOOP VERSUS SINGLE DRIFT RATE

	MEAN SINGLE DRIFT ΔG FOR 615 & 617	MEAN LOOP ΔG FOR 615 & 617	MGAL DIFFERENCES
Hickam MATS	0.00	0.00	0.00
Pearl Harbor	+4.81	+4.84	-0.03
Laysan Beach	+369.12	+369.10	+0.02
Laysan Hiran	+368.48	+368.42	+0.06
Lisianski Hiran	+421.78	+421.70	+0.08
Lisianski Beach	+422.91	+422.83	+0.08
Pearl Hermes Hiran	+510.36	+510.26	+0.10
Midway Gate 2	+561.06	+560.96	+0.10
Midway Gate 2	+561.00	+560.96	+0.04
Kure Island	+606.12	+606.03	+0.09
Midway Gate 2	+561.10	+561.00	+0.10
Midway Old Ops	+565.36	+565.32	+0.04
Midway Gate 2	+561.02	+561.00	+0.02
Johnson Island	-214.17	-214.10	-0.07
A.F.L. Bonham	+120.78	+120.88	-0.10
French Frigate Shoals	+246.02	+246.08	-0.06

Molokai Airport	+25.74	+25.74	0.00
Maui Kahului Airport	-44.34	-44.30	-0.04
Kamuela Airport	-160.66	-160.66	0.00
Hilo General Lyman Field	-58.43	-58.42	-0.01
Kamuela Airport	-160.63	-160.61	-0.02
Maui Kahului Airport	-44.26	-44.23	-0.03
Molukai Airport	+25.70	+25.74	-0.04
Lihue Airport	+103.82	+103.89	-0.07
K-1 Bridge	-72.18	+73.28	-0.10
Kalahed USGS BM"700"	+43.10	+43.17	-0.07
Port Allen USGS BM 35	+70.69	+70.74	-0.05
Waimea USGS BM 9	+87.26	+87.28	-0.02
Bonham	+120.89	+120.91	-0.02
Waimea USGS BM 9	+87.26	+87.28	-0.02
Port Allen USGS BM 35	+70.70	+70.70	0.00

Kalahed BM "700"	1 Aug 61 21.13	26.8521	+43.17	+43.13	+0.04
Port Allen USGS BM"35"	22.17	26.8954	+70.64	+70.61	+0.03
Waimea USGS "9"	23.13	26.9354	+87.08	+87.06	+0.02
Bonham	23.98	26.9708	+120.84	+120.83	+0.01
Waimea USGS BM "9"	2 Aug 61 00.43	26.9896	+87.11	+87.10	+0.01
Port Allen USGS BM "35"	01.20	27.0217	+70.59	+70.59	-0.00
Kalahed USGS BM 700	01.57	.0371	+43.20	+43.21	-0.01
K-1 Bridge	01.87	.0496	+73.22	+73.22	-0.00
Lihue Airport Gate 1	02.28	.0667	+103.84	+103.85	-0.01
Wailua Bridge	16.45	.6571	+127.17	+127.13	+0.04
Kapaa Armory	16.65	.6654	+124.21	+124.17	+0.04
Kahal Point Light House	16.98	.6792	+116.09	+116.06	+0.03
Koolau Shoal	17.38	.6958	+110.29	+110.25	+0.04
Kilauea Tele. Exc.	17.65	.7071	+110.76	+110.73	+0.03

APPENDIX B

LOOP COMPUTATIONS

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam MATS Term.	6Jul61 0041		4	73.33	.69594	51.03	-.01			51.02	278.38	0.00
		55										
Pearl Harbor	0136	55	4	80.23	.69594	55.84	0.00		-.02	55.82	278.38	+4.80
Pearl Harbor	1710		4	80.56	.69594	56.06	+.09	-.31 -.31			278.38	
		5987										
Laysan Beach	10Jul61 2057	6042	10	07.26	.69594	05.05	+.13	-.31	-2.30	02.54	695.94	+369.08
Laysan Beach	12Jul61 0233		10	08.40	.69594	05.85	+.04	-.71 -1.02			695.94	
		17										
Laysan Hiran	0250	6059	10	07.43	.69594	05.17	+.02	-1.02	-2.34	01.83	695.94	+368.37
		1102										
Lisianski Hiran	2112	7161	10	84.60	.69594	58.88	+.09	-1.02	-2.76	55.19	695.94	+421.73
		21										
Lisianski Beach	2133	7182	10	86.13	.69594	59.94	+.11	-1.02	-2.77	56.26	695.94	+422.80
		1577										
Pearl & Hermes Hiran	13Jul61 2350	8759	12	12.63	.69594	08.79	+.16	-1.02	-3.38	04.55	835.13	+510.28
		1244										
Midway Gate 2	14Jul61 2034	10003	12	86.46	.69594	60.17	-.02	-1.02	-3.86	55.27	835.13	561.00
		572										
Hickam MATS Term.	15Jul61 0606	10575	4	80.76	.69594	56.20	-.08	-1.02	-4.08	51.02	278.38	0.00

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
Lt. Schweninger	Davis	21 Mar 63
INSTRUMENT	**CHECKED BY**	**DATE**
#615	Stinnette	21 Mar 63

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam AFB MATS Term	6Jul61 0041		4	68.47	.6938	47.50	-.01			47.49	277.67	
		55 / 55										
Pearl Harbor Berth-M-3	0136		4	75.50	.6938	52.38	+.00		-.01	52.37	277.67	+ 4.88
		5987 / 6042										
Pearl Harbor Berth-M-3	1710		4	75.70	.6938	52.52	+.09	-.23 / -.23		52.37	277.67	
Layson Is. Top of Beach	10Jul61 2057		10	02.57	.6950	1.79	+.13	-.23	-1.45	0.24	694.03	+369.11
		17 / 6059										
Layson Is. Top of Beach	12Jul61 0233		10	03.34	.6950	2.32	+.04	-.44 / -.67		0.24	694.03	
		1102 / 7161										
Layson Is. Tri. Sta.	0250		10	02.43	.6950	1.69	+.02	-.67	-1.45	- 9.41	694.03	+368.46
		21 / 7182										
Lisiawski Is. C & GS Sta.	2112		10	79.27	.6950	55.09	+.09	-.67	-1.71	52.80	694.03	+421.67
		1577 / 8759										
Lisiawski Is. Top of Beach	2133		10	80.97	.6950	56.27	+.11	-.67	-1.72	53.99	694.03	+422.86
		1244 / 10003										
Southeast Is. Pearl & Herms	13Jul61 2350		12	07.27	.6937	5.04	+.16	-.67	-2.10	2.43	832.98	+510.25
		572 / 10575										
Midway USN Sta Gate #2 at Term	14Jul61 2034		12	80.97	.6937	56.17	-.02	-.67	-2.39	53.09	832.98	+560.91
Hickam AFB MATS Term	15Jul61 0606		4	73.17	.6938	50.77	-.08	-.67	-2.53	47.49	277.67	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: J.B.S.
INSTRUMENT: #617
COMPUTED BY: Ramsey — DATE: 24 Jul 61
CHECKED BY: Stinnette — DATE: 24 Jul 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam AFB	18Jul61 1954			483.40	.69594	336.42	-.02			336.40		
		431 / 431										
Midway Gate 2	19Jul61 0305			1289.36		897.32	+.08		-.10	897.30		+560.90
		87 / 518						-.48 / -.48				
Midway Gate 2	2058			1290.17		897.88	.00					
Kure Island	2225			1355.07		943.05	-.01	-.48	-.12	942.44		+606.04
		50 / 568						-.17 / -.65				
Kure Island	20Jul61 0341			1355.23		943.16	+.05					
Midway Gate 2	0431			1290.47		898.09	+.05	-.65	-.13	897.36		+560.96
		11 / 579						-.16 / -.81				
Midway Gate 2	1829			1290.67		898.23	+.07					
Midway Old Ops	1840	10 / 589		1296.90		902.56	+.06	-.81	-.13	901.68		+565.28
Midway Gate 2	1850	450 / 1039		1290.70		898.25	+.06	-.81	-.14	897.36		+560.96
Hickam AFB	21Jul61 0220			484.83		337.41	+.04	-.81	-.24	336.40		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
A2C Meyn	Stinnette	4 Aug 61
INSTRUMENT	CHECKED BY	DATE
#615	W.H.R.	4 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam AFB	18Jul61 1954	431	4	74.70	.6938	51.83	-.02			51.81	277.67	
Midway Gate 2	19Jul61 0305	431	12	82.90	.6937	57.51	+.08		-.08	57.51	832.98	+561.01
Midway Gate 2	2058	87	12	83.40	.6937	57.85	.00	-.26 / -.26				
Kure Island	2225	518	13	48.37	.6929	33.52	-.01	-.26	-.10	33.15	902.35	+606.02
Kure Island	20Jul61 0341	50	13	48.37	.6929	33.52	+.05	-.06 / -.32				
Midway Gate 2	0431	568	12	83.50	.6937	57.92	+.05	-.32	-.11	57.54	832.98	+561.04
Midway Gate 2	1829	11	12	83.77	.6937	58.11	+.07	-.21 / -.53				
Midway Old Ops	1840	579	12	90.03	.6937	62.45	+.06	-.53	-.11	61.87	832.98	+565.37
Midway Gate 2	1850	10	12	83.77	.6937	58.11	+.06	-.53	-.11	57.53	832.98	+561.03
Hickam AFB	21Jul61 0220	589 / 450 / 1039	4	75.67	.6938	52.50	+.04	-.53	-.20	51.81	277.67	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: 1/Lt Schweninger
COMPUTED BY: Stinnette
DATE: 3 Aug 61
INSTRUMENT: #617
CHECKED BY: W.H.R.
DATE: 4 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam AFB	22Jul61 1546	300		485.83	.69594	388.11	+.05			338.16		
Johnson Is.	2046	300		178.33		124.11	+.11		-.15	124.07		-214.09
Johnson Is.	23Jul61 0128	320		178.63		124.32	-.03	-.07				
Hickam AFB	0648	620		486.40		338.51	+.04	-.07	-.32	338.16		
Hickam AFB	24Jul61 1641	127		487.50	.69594	339.27	+.02			339.29		
A.L.F.Bonham	1848	127		661.13		460.11	+.13		-.05	460.19		+120.90
French Frigate SHOALS	2153	185 / 312 / 299 / 611		841.20		585.42	+.16		-.13	585.45		+246.16
Hickam AFB	25Jul61 0252			488.00		339.62	-.08		-.25	339.29		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
A2C Mayn	Stinnette	4 Aug 61
INSTRUMENT	**CHECKED BY**	**DATE**
#615	W.H.R.	4 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam AFB	22Jul61 1546		4	76.27	.6938	52.92	+.05			52.97	277.67	
		300										
Johnson Is.	2046	300	1	67.83	.6943	47.09	+.11		0.00	47.20	69.34	-214.10
Johnson Is.	23Jul61 0128		1	68.33	.6943	47.44	-.03	-.21				
		320						-.21				
Hickam AFB	0648	620	4	76.60	.6938	53.15	+.04	-.21	-.01	52.97	277.67	
Hickam AFB	24Jul61 1641		4	77.20	.6938	53.56	+.02			53.58	277.67	
		127										
A.L.F.Bonham	1848	127	6	51.43	.6934	35.66	+.13		-.08	35.71	416.41	+120.87
		185										
French Frigate SHOALS	2153	312	8	31.93	.6943	22.17	+.16		-.19	22.14	555.12	+246.01
		299										
Hickam AFB	25Jul61 0252	611	4	77.87	.6938	54.03	-.08		-.37	53.58	277.67	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
1/Lt Schweniger	Stinnette	3 Aug 61
INSTRUMENT	CHECKED BY	DATE
#617	W.H.R.	4 Aug 61

1387 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam AFB	29Jul61 1850			491.57	0.69594	342.10	-.07			342.03		
		70										
Molokai Airport	2000	70		528.53	0.69594	367.83	-.01		-.02	367.80		+25.77
		47										
Maui Kahului Airport	2047	117		427.87	0.69594	297.77	+.05		-.04	297.78		-44.25
		62										
Kamuela Airport	2149	179		260.23	0.69594	181.10	+.13		-.06	181.17		-160.86
		43										
Hilo General Lyman Field	2232	222		407.43	0.69594	283.55	+.17		-.07	283.65		-58.38
		40										
Kamuela Airport	2312	262		260.23	0.69594	181.10	+.19		-.08	181.21		-160.82
		48										
Maui Kahului Airport	0000	310		427.82	0.69594	297.74	+.20		-.10	297.84		-44.19
		40										
Molokai Airport	30Jul61 0040	350		528.30	0.69594	367.67	+.18		-.11	367.74		+25.71
		57										
Hickam AFB	0137	407		491.43	0.69594	342.01	+.15		-.13	342.03		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER A2C Meyn | COMPUTED BY Stinnette | DATE 15 Aug 61

INSTRUMENT #615 | CHECKED BY Ramsey | DATE 15 Aug 61

1381 FORM JUN 61 C-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam AFB	29Jul61 1850	70	4	80.17	.6938	55.62	-.07			55.55	277.67	
Molokai Airport	2000	70 / 47	5	17.13	.6936	11.88	-.01		0.00	11.87	347.05	+25.70
Maui Kahului Airport	2047	117 / 62	4	16.07	.6938	11.15	+.05		0.00	11.20	277.67	-44.35
Kamuela Airport	2149	179 / 43	2	48.73	.6946	33.85	+.13		0.00	33.98	138.77	-160.47
Hilo General Lyman Field	2232	222 / 40	3	95.57	.6944	66.36	+.17		+.01	66.54	208.23	-58.45
Kamuela Airport	2312	262 / 48	2	48.73	.6946	33.85	+.19		+.01	34.05	138.77	-160.40
Maui Kahului Airport	0000	310 / 40	4	15.95	.6938	11.07	+.20		+.01	11.28	277.67	-44.27
Molokai Airport	30Jul61 0040	350 / 57	5	16.93	.6936	11.74	+.18		+.01	11.93	347.05	+25.76
Hickam AFB	0137	407	4	79.83	.6938	55.39	+.15		+.01	55.55	277.67	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER 1/Lt Schweninger
INSTRUMENT #617
COMPUTED BY Stinnette
CHECKED BY Ramsey
DATE 15 Aug 61
DATE 15 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam AFB	31Jul61 1643			492.67	.69594	342.87	0.00			342.87		
		202										
Lihue Airport	2005	202		642.33	.69594	447.02	-.05		-.16	446.81		+103.94
								-.37				
Lihue Airport	1Aug61 1714	173		642.73	.69594	447.30	+.04	-.37				
		375										
K-1 Bridge	2007	61		599.00	.69594	416.87	-.03	-.37	-.30	416.17		+ 73.30
		436										
Kalahed U.S.G.S.BM700	2108	62		555.77	.69594	386.78	-.02	-.37	-.35	386.04		+ 43.17
		498										
Port Allen US GS BM"35"	2210	58		595.60	.69594	414.50	-.01	-.37	-.40	413.72		+ 70.85
		556										
Waimea USGS BM"9"	2308	51		619.53	.69594	431.16	+.02	-.37	-.45	430.36		+ 87.49
		607										
Bonham	2359	27		667.67	.69594	464.66	+.05	-.37	-.49	463.85		+120.98
		634										
Waimea USGS BM "9"	2Aug61 0026	46		619.50	.69594	431.13	+.06	-.37	-.51	430.31		+ 87.44
		680										
Port Allen USGS BM "35"	0112	22		595.63	.69594	414.52	+.08	-.37	-.55	413.68		+ 70.81
		702										
Kalahed USGS BM 700	0134	18		556.03	.69594	386.96	+.08	-.37	-.57	386.10		+ 43.23
		720										
K-1 Bridge	0152	25		599.40	.69594	417.15	+.09	-.37	-.58	416.29		+ 73.42
		745										
Lihue Airport Gate 1	0217			643.47	.69594	447.82	+.09	-.37	-.61	446.93		+104.06
								-.25				
Lihue Airport Gate 1	1605			643.83	.69594	448.07	+.09	-.62				

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
A2C Meyn	Stinnette	15 Aug 61
INSTRUMENT	**CHECKED BY**	**DATE**
#615	Ramsey	15 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam AFB	31Jul61 1643		4	80.80	.6938	56.06	0.00			56.06	277.67	
		202										
Lihue Airport	2005	202	6	30.70	.6934	21.29	-.05		-.08	21.16	416.41	+103.84
Lihue Airport	1Aug 61 1714		6	30.93	.6934	21.45	+.04	-.25 / -.25			416.41	
		173										
K-1 Bridge	2007	375	5	87.03	.6936	60.36	-.03	-.25	-.15	59.93	347.05	+ 73.25
		61										
Kalahed USGS BM "700"	2108	435	5	43.67	.6936	30.29	-.02	-.25	-.17	29.85	347.05	+ 43.17
		62										
Port Allen USGS BM "35"	2210	498	5	83.30	.6936	57.78	-.01	-.25	-.20	57.32	347.05	+ 70.64
		58										
Waimea USGS BM "9"	2308	556	6	07.00	.6934	4.85	+.02	-.25	-.22	4.40	416.41	+ 87.08
		51										
Bonham	2359	607	6	55.67	.6934	38.60	+.05	-.25	-.24	38.16	416.41	+120.84
		27										
Waimea USGS BM "9"	2Aug61 0026	634	6	07.03	.6934	04.87	+.06	-.25	-.25	4.43	416.41	+ 87.11
		46										
Port Allen USGS BM "35"	0112	680	5	83.20	.6936	57.71	+.08	-.25	-.27	57.27	347.05	+ 70.59
		22										
Kalaheo USGS BM "700"	0134	702	5	43.73	.6936	30.33	+.08	-.25	-.28	29.88	347.05	+ 43.20
		18										
K-1 Bridge	0152	720	5	87.00	.6936	60.34	+.09	-.25	-.28	59.90	347.05	+ 73.22
		25										
Lihue Airport Gate 1	0217	745	6	31.17	.6934	21.61	+.09	-.25	-.29	21.16	416.41	+103.84
Lihue Airport Gate 1	1605		6	31.37	.6934	21.75	+.09	-.14 / -.39			416.41	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: 1/Lt Schweninger
COMPUTED BY: Stinnette — DATE: 15 Aug 61
INSTRUMENT: #617
CHECKED BY: Ramsey — DATE: 15 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Lihue Airport Gate 1	2Aug61 1605											
		22										
Wailua Bridge	1627	767		677.40	.69594	471.43	+.09	-.62	-.62	470.28		+127.41
		12										
Kapaa Armory	1639	779		673.07	.69594	468.42	+.09	-.62	-.63	467.26		+124.39
		20										
Kahal Point Light House	1659	799		661.47	.69594	460.34	+.09	-.62	-.65	459.16		+116.29
		24										
Koolau School	1723	823		653.27	.69594	454.64	+.08	-.62	-.67	453.43		+110.56
		16										
Kilauea Tele. Exc.	1739	839		653.90	.69594	455.08	+.07	-.62	-.68	453.85		+110.98
		24										
USGS BM 17 Hanalei Bridge	1803	863		690.60	.69594	480.62	+.06	-.62	-.70	479.36		+136.49
		28										
Wainiha BM 101 Power House	1831	891		695.20	.69594	483.82	+.05	-.62	-.72	482.53		+139.66
		62										
Kilauea Tele. Exc.	1933	953		654.07	.69594	455.19	+.02	-.62	-.77	453.82		+110.95
		46										
Kapaa Armory	2019	999		673.43	.69594	468.67	+.01	-.62	-.81	467.25		+124.38
		216										
Kokee 109 AC&W Station	2355	1215		256.33	.69594	178.39	+.02	-.62	-.99	176.80		-166.07
		132										
Lihue Airport	31Aug61 0207	1347		644.10	.69594	448.25	+.06	-.62	-1.09	446.60		+103.73
		155										
Hickam AFB	0442	1502		495.25	.69594	344.66	+.05	-.62	-1.22	342.87		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
A2C Meyn	Stinnette	15 Aug 61
INSTRUMENT	**CHECKED BY**	**DATE**
#615	Ramsey	15 Aug 61

1381 FORM JUN 61 O-24

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Lihue Airport Gate 1	2Aug61 1605				.6934			-.39			416.41	
Wailua Bridge	1627	22 / 767	6	65.03	.6934	45.09	+.09	-.39	-.30	44.49	416.41	+127.17
Kapaa Armory	1639	12 / 779	6	60.77	.6934	42.14	+.09	-.39	-.31	41.53	416.41	+124.21
Kahal Point Light House	1659	20 / 799	6	49.07	.6934	34.03	+.09	-.39	-.32	33.41	416.41	+116.09
Koolau School	2Aug61 1723	24 / 823	6	40.73	.6934	28.24	+.08	-.39	-.32	27.61	416.41	+110.29
Kilauea Tele. Exc.	1739	16 / 839	6	41.43	.6934	28.73	+.07	-.39	-.33	28.08	416.41	+110.76
Hanalei Bridge USGS BM "17"	1803	24 / 863	6	78.20	.6934	54.22	+.06	-.39	-.34	53.55	416.41	+136.23
Wainiha Power House BM 101	1831	28 / 891	6	83.03	.6934	57.57	+.05	-.39	-.35	56.88	416.41	+139.56
Kilauea Tele. Exc.	1933	62 / 953	6	41.57	.6934	28.82	+.02	-.39	-.38	28.07	416.41	+110.75
Kapaa Armory	2019	46 / 999	6	61.10	.6934	42.37	+.01	-.39	-.39	41.60	416.41	+124.28
Kokee 109 AC&W Station	2355	216 / 1215	2	43.47	.6946	30.19	+.02	-.39	-.48	29.34	138.77	-165.62
Lihue Airport	3Aug61 0207	132 / 1347	6	31.73	.6934	22.00	+.06	-.39	-.53	21.14	416.41	+103.82
Hickam AFB	0436	149 / 1496	4	82.14	.6938	56.99	+.05	-.39	-.59	56.06	277.67	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: 1/Lt Schweninger
INSTRUMENT: #617
COMPUTED BY: Stinnette
DATE: 15 Aug 61
CHECKED BY: Ramsey
DATE: 15 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam MATS Term	7Aug61 1648	106		498.28	.69594	346.77	+.02			346.79		
Molokai Airport	1834	106		535.23	.69594	372.49	+.10		-.04	372.55		+ 25.76
Molokai Airport	15Aug61 0238	73		1610.63	.69594	1120.90	+.07	-74838 -74838				
Hickam MATS Term	0351	179		1573.73	.69594	1095.22	+.02	-74838	-.07	346.79		
												#617
Hickam MATS Term	7Aug61 1649	105	4	84.23	.6938	58.44	+.02			58.46	277.67	
Molokai Airport	1834	105	5	21.40	.6936	14.84	+.10		-.01	14.93	347.05	+ 25.85
Molokai Airport	0238	73	16	10.83	.6933	07.51	+.07	+7.36 +7.36				
Hickam MATS Term	0351	178	15	73.77	.6927	51.10	+.02	+7.36	-.02	58.46	1040.89	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
A2C Meyn	Stinnette	30 Aug 61
INSTRUMENT #615 & 617	CHECKED BY Radtke	DATE 31 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Molokai Airport	8Aug61 1806			536.17	.69594	373.14	+.04			373.18		
		31/31										
Kualapuu USGS BM 878	1837			474.13	.69594	329.97	+.07		-.02	330.02		-43.16
		13/44										
Kalaupapa Lookout	1850			382.30	.69594	266.06	+.08		-.02	266.12		-107.06
		31/75										
Molokai Airport	1921			536.13	.69594	373.11	+.11		-.04	373.18		
Molokai Airport	8Aug61 1806	31/31	5	21.97	.6936	15.24	+.04			15.28	347.05	
Kualapuu USGS BM 878	1837	13/44	4	59.70	.6938	41.42	+.07		+.03	41.52	277.67	-43.14
Kalaupapa Lookout	1850	31/75	3	67.80	.6944	47.08	+.08		+.04	47.20	208.23	-106.90
Molokai Airport	1921		5	21.77	.6936	15.10	+.11		+.07	15.28	347.05	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER A2C Meyn 615 Lt Schweninger 617 | COMPUTED BY Stinnette | DATE 30 Aug 61

INSTRUMENT #615 & #617 | CHECKED BY Radtke | DATE 31 Aug 61

1381 FORM JUN 61 O-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Molokai Airport	8Aug61 1921			536.13	.69594	373.11	+.11			373.22		
		25										
Kaunakakai USGS BM	1946	25		535.20	.69594	372.47	+.13		-.02	372.58		-0.64
		29										
Hwy 45 Bridge	2015	54		522.87	.69594	363.89	+.14		-.05	363.98		-9.24
		21										
Kamalo USGS BM 39	2036	75		521.97	.69594	363.26	+.15		-.07	363.34		-9.88
		23										
Pukoo Fish Pond	2059	98		527.00	.69594	366.76	+.16		-.10	366.82		-46.40
		31										
Kanaha Point USGS BM 48	2130	129		530.33	.69594	369.08	+.16		-.13	369.11		-4.11
		40										
Halawa USGS BM 25	2210	169		541.07	.69594	376.55	+.15		-.17	376.53		+3.31
		54										
Pukoo Fish Pond	2304	223		527.57	.69594	367.16	+.12		-.22	367.06		-6.16
		37										
Kaunakakai	2341	260		535.67	.69594	372.79	+.09		-.26	372.62		-0.60
		72										
Molokai Airport	9Aug61 0053	332		536.73	.69594	373.53	+.02		-.33	373.22		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
A2C Meyn	Stinnette	31 Aug 61
INSTRUMENT	CHECKED BY	DATE
#615	Radtke & Ramsey	31 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Molokai Airport	8Aug61 1921		5	21.77	.6936	15.10	+.11			15.21	347.05	
Kaunakakai USGS BM	1946	25	5	20.90	.6936	14.50	+.13		-.02	14.61	347.05	-0.60
Hwy 45 Bridge	2015	25	5	08.47	.6936	05.87	+.14		-.04	05.97	347.05	-9.24
Kamalo USGS BM 39	2036	29	5	07.77	.6936	05.39	+.15		-.06	05.48	347.05	-9.73
Pukoo Fish Pond	2059	54	5	12.73	.6936	08.83	+.16		-.08	08.91	347.05	-6.30
Kanaha Point USGS BM 48	2130	21	5	16.07	.6936	11.15	+.16		-.10	11.21	347.05	-4.00
Halawa USGS BM 25	2210	75	5	26.87	.6936	18.64	+.15		-.13	18.66	347.05	+3.45
Pukoo Fish Pond	2304	23	5	12.77	.6936	08.86	+.12		-.17	08.81	347.05	-6.40
Kaunakakai	2341	98	5	21.10	.6936	14.63	+.09		-.20	14.52	347.05	-0.69
Molokai Airport	9Aug61 0053	31	5	22.27	.6936	15.45	+.02		-.26	15.21	347.05	
		129										
		40										
		169										
		54										
		223										
		37										
		260										
		72										
		332										

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: 1/Lt Schweninger
INSTRUMENT: #617
COMPUTED BY: Stinnette
CHECKED BY: Radtke & Ramsey
DATE: 31 Aug 61
DATE: 31 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Molokai Airport	9Aug61 0053			536.73	.69594	373.53	+.02			373.55		
		26 / 26										
Puunana USGS Resevoir BM	0119			448.47	.69594	312.11	0.00		+.02	312.13		-61.42
		29 / 55										
USGS BM 1102 Manunaloa	0148			459.47	.69594	319.76	-.03		+.04	319.77		-53.78
		29 / 84										
Waieli Trig. Sta.	0217			491.13	.69594	341.80	-.05		+.06	341.81		-31.74
		112 / 196										
Kaeo Trian. Sta.	0409			478.43	.69594	332.96	-.07		+.13	333.02		-40.53
		44 / 240										
Molokai Airport	0453			536.63	.69594	373.46	-.07		+.16	373.55		
Molokai Airport	9Aug61 0053		5	22.27	.6936	15.45	+.02			15.47	347.05	
		26 / 26										
Puunana USGS Resevoir BM	0119		4	33.93	.6938	23.54	0.00		+.01	23.55	277.67	-61.30
		29 / 55										
USGS BM 1102 Mauna Loa	0148		4	45.17	.6938	31.34	-.03		+.02	31.33	277.67	-53.52
		29 / 84										
Waieli Trig. Sta.	0217		4	76.77	.6938	53.26	-.05		+.02	53.23	277.67	-31.62
		111 / 195										
Kaeo Trian. Sta.	0408		4	64.08	.6938	44.46	-.07		+.06	44.45	277.67	-40.40
		45 / 240										
Molokai Airport	0453		5	22.30	.6936	15.47	-.07		+.07	15.47	347.05	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER 1/Lt Schweninger 617 | COMPUTED BY Stinnette | DATE 30 Aug 61

INSTRUMENT #615 & #617 | CHECKED BY Radtke | DATE 31 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Molokai Airport	9Aug61 1831			536.70	.69594	373.51	+.04			373.55		
		62										
Lanai Airport	1933	62		376.40	.69594	261.95	+.10			262.05		-111.50
		53										
Hana Airport	2026	115		495.67	.69594	344.96	+.15			345.11		- 28.44
		42										
Kahului Airport	2108	157		436.07	.69594	303.48	+.17			303.65		- 69.90
Kahului Airport	15Aug61 0041			1510.10	.69594	1050.94	+.13	-74742 -74742				
		45										
Hana Airport	0126	202		1570.15	.69594	1092.73	+.11	-74742		345.42		- 28.13
		40										
Lanai Airport	0206	242		1450.17	.69594	1009.23	+.10	-74742		261.91		-111.64
		32										
Molokai Airport	0238	274		1610.63	.69594	1120.90	+.07	-74742		373.55		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: A2C Meyn
INSTRUMENT: #615
COMPUTED BY: Stinnette — DATE: 31 Aug 61
CHECKED BY: Radtka & Ramsey — DATE: 1 Sep 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Molokai Airport	9Aug61 1831		5	22.53	.6936	15.63	+.04			15.67	347.05	
		62										
Lanai Ariport	1933	62	3	61.97	.6944	43.03	+.10		0.00	43.13	208.23	-111.36
		53										
Hana Airport	2026	115	4	81.37	.6938	56.45	+.15		0.00	56.60	277.67	- 28.45
		42										
Kahului Airport	2108	157	4	21.53	.6938	14.94	+.17		+0.01	15.12	277.67	- 69.93
Kahului Airport	15Aug61 0041		15	09.80	.6927	06.79	+.13	-75503 -75503			1040.89	
		45										
Hana Airport	0126	202	15	69.68	.6927	48.27	+.11	-75503	+.01	-706.64		- 28.47
		40										
Lanai Airport	0206	242	14	50.27	.6925	34.81	+.10	-75503	+.01	-720.11	971.64	-111.19
		32										
Molokai Airport	0238	274	16	10.83	.6933	07.51	+.07	-75503	+.01	-747.44	1110.16	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: 1/Lt Schweninger
INSTRUMENT: #617
COMPUTED BY: Stinnette
CHECKED BY: Radke & Ramsey
DATE: 1 Sep 61
DATE: 1 Sep 61

1387 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kahului Airport	10Aug61 1926			436.97	.69594	304.10	+.07			304.17		
		94										
Kahakuloa USGS BM	2100	94		446.15	.69594	310.49	+.15		+.01	310.65		+6.48
		111										
Honokawai Hwy 30	2251	205		457.57	.69594	318.44	+.16		+.01	318.61		+14.44
		27										
Lahaina USGS BM	2318	232		448.60	.69594	312.20	+.15		+.01	312.36		+8.19
		23										
Olowalu Bridge	2341	255		448.33	.69594	312.01	+.13		+.02	312.16		+7.99
		39										
Hwy 30 & 31 Intersection	11Aug61 0020	294		432.27	.69594	300.83	+.10		+.02	300.95		-3.22
		19										
Wailuku Court House	0039	313		426.43	.69594	296.77	+.09		+.02	296.88		-7.29
		24										
Kahului Airport	0103	337		436.93	.69594	304.08	+.07		+.02	304.17		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: A2C Meyn
INSTRUMENT: #615
COMPUTED BY: Stinnette
CHECKED BY: Radtke
DATE: 30 Aug 61
DATE: 31 Aug 61

1381 FORM JUN 61 O-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kahului Airport	10Aug61 1926		4	22.07	.6938	15.31	+.07			15.38	277.67	
		94										
Kahakuloa USGS BM	2100	94	4	31.18	.6938	21.63	+.15		-.05	21.73	277.67	+6.35
		111										
Honokowai Hwy 30	2251	205	4	42.83	.6938	29.72	+.16		-.11	29.77	277.67	+14.39
		27										
Lahaina USGS BM	2318	232	4	34.03	.6938	23.61	+.15		-.12	23.64	277.67	+8.26
		23										
Olowalu Bridge	2341	255	4	33.70	.6938	23.38	+.13		-.14	23.37	277.67	+7.99
		39										
Hwy 30 & 31 Intersection	11Aug61 0020	294	4	17.60	.6938	12.21	+.10		-.16	12.15	277.67	-3.23
		19										
Wailuku Court House	0039	313	4	11.93	.6938	08.28	+.09		-.17	08.20	277.67	-7.18
		24										
Kahului Airport	0103	337	4	22.33	.6938	15.49	+.07		-.18	15.38	277.67	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: Lt Schweninger
COMPUTED BY: Stinnette
DATE: 30 Aug 61
INSTRUMENT: #617
CHECKED BY: Radtke
DATE: 31 Aug 31

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kahului Airport	11Aug61 2007			437.50	.69594	304.47	+.09			304.56		
		98										
Hwy 37 Makena Jct Hwy 31	2145			277.80	.69594	193.33	+.16		-.01	193.48		-111.08
		98										
		267										
Puu Maneoneo Trian. Sta.	12Aug61 0212			411.15	.69594	286.14	-.02		-.04	286.12		-18.44
		365										
		83										
Kipahulu USGS BM 192	0335			451.70	.69594	314.36	-.05		-.05	314.26		+ 9.70
		448										
		37										
Muolea USGS BM 335	0412			460.87	.69594	320.74	-.07		-.05	320.62		+16.06
		485										
		63										
Hana Airport	0515			497.24	.69594	346.05	-.08		-.06	345.91		+41.35
		548										
Hana Airport	12Aug61 1744			497.47	.69594	346.21	-.07	-.17 -.17				
		49										
Nahiku USGS BM 44-M-1923 on Bridge	1833			413.00	.69594	287.42	-.03	-.17	-.17	287.15		-17.41
		597										
		25										
Koolau Ditch Intake	1858			373.93	.69594	260.23	-.01	-.17	-.07	259.98		-44.58
		622										
		84										
Kailua USGS BM M-11-1923	2022			409.13	.69594	284.73	+.07	-.17	-.08	284.55		-20.01
		706										
		56										
Kaiku USGS BM	2118			420.57	.69594	292.69	+.12	-.17	-.09	292.55		-12.01
		762										
		41										
Kahului Airport	2159			437.80	.69594	304.68	+.14	-.17	-.09	340.56		
		803										

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER A2C Meyn

INSTRUMENT #615

COMPUTED BY Stinnette

DATE 30 Aug 61

CHECKED BY Padtke

DATE 31 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kahului Airport	11Aug61 2007		4	22.70	.6938	15.75	+.09			15.84	277.67	
		98										
Makena Hwy 37 Jct Hwy 31	2145	98	2	62.93	.6946	43.71	+.16		+.07	43.94	138.77	-110.80
		152										
Kepuni Bridge	12Aug61 0017	250	3	51.80	.6944	35.97	+.13		+.18	36.28	208.23	-49.00
		115										
Puu Maneoneo Trian. Sta.	0212	365	3	95.58	.6944	66.37	+.02		+.26	66.65	208.23	-18.63
		83										
Kipahulu USGS BM 192	0335	448	4	36.07	.6938	25.03	-.05		+.32	25.30	277.67	+9.46
		37										
Mualea USGS BM 335	0412	485	4	45.30	.6938	31.43	-.07		+.35	31.71	277.67	+15.87
		63										
Hana Airport	0515	548	4	81.84	.6938	56.78	-.08		+.40	57.10	277.67	+41.26
Hana Airport	1744	49	4	82.33	.6938	57.12	-.07	-.35 -.35				
		597										
Nahiku USGS BM 44-M-1923 on Bridge	1833	25	3	97.67	.6944	67.82	-.03	-.35	+.43	67.87	208.23	-17.41
		622										
Koolau Ditch	1858	84	3	58.60	.6944	40.69	-.01	-.35	+.45	40.78	208.23	-44.50
		706										
Kailua USGS BM M-11-1923	2022	56	3	93.77	.6944	65.11	+.07	-.35	+.51	65.34	208.23	-19.94
		762										
Haiku USGS BM	2118	41	4	04.93	.6938	03.42	+.12	-.35	+.55	03.74	277.67	-12.10
		803										
Kahului Airport	2159		4	22.30	.6938	15.47	+.14	-.35	+.58	15.84	277.67	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER Lt Schweninger | COMPUTED BY Stinnette | DATE 30 Aug 61

INSTRUMENT #617 | CHECKED BY Radtke | DATE 31 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kahului Airport	13Aug61 2343			1509.17	.69594	1050.29	+.15			1050.44		
		197										
Makawao USGS BM	14Aug61 0300	197		1369.40	.69594	971.81	+.02		-.09	971.74		-78.70
		66										
Upper Paia USC&GS BM	0406	263		1502.12	.69594	1045.39	-.03		-.12	1045.24		-5.20
		47										
Kihei USC&GS BM	0453	310		1519.17	.69594	1057.25	-.06		-.14	1057.05		+6.61
		27										
Kahului Airport	0520	337		1509.70	.69594	1050.66	-.07		-.15	1050.44		
Kahului Airport	13Aug61 2343			09.10	.6927	06.30	+.15			06.45	1040.89	
		197										
Makawanu USGS BM	14Aug61 0300	197		96.13	.6929	66.61	+.02		-.04	66.59	902.35	-78.40
		66										
Upper Paia USC&GS BM	0406	263		02.15	.6927	01.49	-.03		-.05	01.41	1040.89	-5.04
		47										
Kihei USC&GS BM	0453	310		19.07	.6927	13.21	-.06		-.06	13.09	1040.89	+6.64
		27										
Kahului Airport	0520	337		09.52	.6927	06.59	-.07		-.07	06.45	1040.89	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER A2C Meyn 615
Lt Schweninger 617

INSTRUMENT #615 & 617

COMPUTED BY Stinnette — DATE 30 Aug 61

CHECKED BY Padtke — DATE 31 Aug 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kahului Airport	14Aug61 1810			1510.10	.69594	1050.94	-.06			1050.88		
		95										
Haleakala Crater	1945	95		661.47	.69594	460.34	-.02		-.02	460.30		-590.58
		31										
Haleakala USC& GS Trian. Sta. Kulekule	2016	126		558.87	.69594	388.94	0.00		-.02	388.92		-661.96
		87										
Kahului Airport	2143	213		1509.97	.69594	1050.85	+.07		-.04	1050.88		
Kahului Airport	14Aug61 1810	95	15	09.97	.6927	06.91	-.06			06.85	1040.89	
		95										
Haleakala Crater	1945	31	6	59.73	.6934	41.42	-.02		-.01	41.39	416.41	-589.94
		126										
Haleakala USC& GS Trian. Sta. Kolekole	2016	87	5	57.03	.6936	39.56	0.00		-.02	39.54	347.05	-661.15
		213										
Kahului Airport	2143		15	09.83	.6927	06.81	+.07		-.03	06.85	1040.89	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER A2C Meyn 615
Lt Schwininger 617

COMPUTED BY Stinnette — DATE 30 Aug 61

INSTRUMENT #617 & #615

CHECKED BY Radtke — DATE 31 Aug 61

1381 FORM JUN 61 C-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam MATS Term	16Aug61 1649			1575.00	0.69594	1096.11	+.02			1096.13		
		159										
Kona Airport	1928	159		1453.42	0.69594	1011.49	-.03		-.08	1011.38		- 84.75
		47										
Kamuela Airport	2015	206		1344.17	0.69594	935.46	-.02		-.11	935.33		-160.80
Kamuela Airport	22Aug61 2045			1348.90	0.69594	938.75	+.17	-3.48 -3.48				
		39										
Kona Airport	2124	245		1458.00	0.69594	1014.68	+.15	-3.48	-.13	1011.22		- 84.91
		239										
Hickam MATS Term	23Aug61 0123	484		1580.45	0.69594	1099.90	-.04	-3.48	-.25	1096.13		
Loop 6												
		33										
Kickam MATS Term	23Aug61 2303	33		1580.80	0.69594	1100.14	+.12			1100.26		
		21										
Bishop Museum	2336	54		1608.40	0.69594	1119.35	+.10		+.01	1119.46		+19.20
Hickam MATS Term	2357			1580.83	0.69594	1100.16	+.08		+.02	1100.26		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: A2C Mayn
INSTRUMENT: #615
COMPUTED BY: Stinnette
CHECKED BY: Waring R.
DATE: 29 Sep 61
DATE:

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam MATS Term	16Aug61 1649		15	74.57	0.6927	51.65	+.02			51.67	1040.89	
		159										
Kona Airport	1928	159	14	52.20	0.6925	36.15	-.03		+.10	36.22	971.64	- 84.70
		47										
Kamuela Airport	2015	206	13	43.17	0.6929	29.91	-.02		+.13	30.02	902.35	-160.19
								-2.55				
Kamuela Airport	22Aug61 2045	39	13	46.57	0.6929	32.27	+.17	-2.55				
		245										
Kona Airport	2124	239	14	55.70	0.6925	38.57	+.15	-2.55	+.16	36.33	971.64	- 84.59
		484										
Hickam MATS Term	23Aug61 0123		15	77.88	0.6927	53.95	-.04	-2.55	+.31	51.67	1040.89	
Loop 6												
Hickam MATS Term	23Aug61 2303	33	15	78.30	0.6927	54.24	+.12			54.36	1040.89	
		33										
Bishop Museum	2336	21	16	06.07	0.6933	04.21	+.10		-.02	04.29	1110.16	+ 19.20
		54										
Hickam MATS Term	2357		15	78.40	0.6927	54.31	+.08		-.03	54.36	1040.89	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: Lt Schweninger
INSTRUMENT: #617
COMPUTED BY: Stinnette — DATE: 29Sep60
CHECKED BY: Waring R. — DATE: 20ct61

1381 FORM JUN 61 O-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kamuela Airport	16Aug61 2015			1344.17	0.69594	935.46	-.02			935.44		
		55										
Hilo, Gen. Lyman Field	2110	55		1491.20	0.69594	1037.79	0.00		-.03	1037.76		+102.30
Hilo, Gen. Lyman Field	17Aug61 1855			1491.93	0.69594	1038.29	0.00	-.50 / -.50				
		39										
Hwy 19 South Pepeeked Jct.	1934	94		1482.23	0.69594	1031.54	-.01	-.50	-.06	1030.97		+ 95.53
		30										
Nanue Bridge	2004	124		1528.37	0.69594	1063.65	-.01	-.50	-.08	1063.06		+127.62
		41										
Kilau Bridge	2045	165		1505.50	0.69594	1047.74	-.01	-.50	-.10	1047.13		+111.69
		30										
Waipunahina Bridge	2115	195		1494.87	0.69594	1040.34	-.01	-.50	-.12	1039.71		+104.27
		31										
Honokaa	2146	226		1465.57	0.69594	1019.95	0.00	-.50	-.14	1019.31		+ 83.87
		51										
Kukuihaele	2237	277		1504.10	0.69594	1046.76	+.02	-.50	-.17	1046.11		+110.67
		69										
Kamuela Airport	2346	346		1345.10	0.69594	936.11	+.04	-.50	-.21	935.48		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
A2C Meyn	Stinnette	28Sep61
INSTRUMENT	CHECKED BY	DATE
#615	Waring R.	

1381 FORM JUN 61 C-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kamuela Airport	16Aug61 2015		13	43.17	0.6929	29.91	-.02			29.89	902.35	
		55										
Hilo, Gen. Lyman Field	2110	55	14	90.60	0.6925	62.74	0.00		-.06	62.68	971.64	+102.08
Hilo, Gen. Lyman Field	17Aug61 1855		14	90.87	0.6925	62.93	0.00	-.19 -.19				
		39										
Hw 19 South Pepeekeo Jct.	1934	94	14	81.20	0.6925	56.23	-.01	-.19	-.10	55.93	971.64	+95.33
		30										
Manue Bridge	2004	124	15	27.33	0.6927	18.93	-.01	-.19	-.14	18.59	1040.89	+127.24
		41										
Kilau Bridge	2045	165	15	04.50	0.6927	03.12	-.01	-.19	-.18	02.74	1040.89	+111.39
		30										
Waipunahina Bridge	2115	195	14	93.93	0.6925	65.05	-.01	-.19	-.21	64.64	971.64	+104.04
		31										
Honokaa	2146	226	14	64.60	0.6925	44.74	0.00	-.19	-.25	44.30	971.64	+83.70
		51										
Kukuinaele	2237	277	15	03.33	0.6927	02.31	+.02	-.19	-.30	01.84	1040.89	+110.49
		69										
Kamuela Airport	2346	346	13	43.90	0.6929	30.42	+.04	-.19	-.38	29.89	902.35	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
Lt Schweninger	Stinnette	28 Sep 61
INSTRUMENT	**CHECKED BY**	**DATE**
# 617	Waring P.	2 Oct 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kamuela Airport	17Aug61 2346	78		1345.10	0.69594	936.11	+.04			936.15		
Waimea	18Aug61 0104	78		1298.53	0.69594	903.70	+.07		-.05	903.72		-32.43
Upolu Airport	0208	64		1492.47	0.69594	1038.67	+.06		-.08	1038.65		+102.50
Manukona Landing	0258	142		1484.68	0.69594	1033.25	+.06		-.11	1033.20		+97.05
Halawa	0412	74		1506.23	0.69594	1048.25	+.04		-.15	1048.14		+111.99
Kamuela Airport	0530	266		1345.43	0.69594	936.34	+.01		-.20	936.15		
		78										
		344										

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: A2C Meyn
INSTRUMENT: #615
COMPUTED BY: Stinnette
CHECKED BY: Waring R.
DATE: 28 Sep 61
DATE:

1381 FORM JUN 61 C-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kamuela Airport	17Aug61 2346		13	43.90	0.6929	30.42	+.04			30.46	902.35	
		78										
Waimea	18Aug61 0104	78	12	97.10	0.6937	67.36	+.07		-.01	67.42	832.98	-32.41
		64										
Upolu Airport	0208	142	14	91.43	0.6925	63.32	+.06		-.02	63.36	971.64	+102.19
		51										
Manukona Landing	0259	193	14	83.53	0.6925	57.84	+.06		.02	57.88	971.64	+96.71
		73										
Halawa	0412	266	15	05.33	0.6927	03.69	+.04		-.03	03.70	1040.89	+111.78
		78										
Kamuela Airport	0530	344	13	44.00	0.6929	30.49	+.01		-.04	30.46	902.35	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
Lt Schweninger	Stinnette	28 Sep 61
INSTRUMENT	CHECKED BY	DATE
#617	Waring R.	2 Oct 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kamuela Airport	18Aug61 1805			1345.77	0.69594	936.58	+.05			936.63		
		55										
Makahuna Bridge	1900	55		1522.97	0.69594	1059.90	+.03		-.01	1059.92		+123.29
		118										
Waipunahina Bridge	2058	173		1495.73	0.69594	1040.94	0.00		-.04	1040.90		+104.27
		79										
Hilo, Gen. Lyman Field	2217	252		1492.87	0.69594	1038.95	0.00		-.06	1038.89		+102.26
		170										
Keaau	19Aug61 0107	422		1469.23	0.69594	1022.50	+.03		-.10	1022.43		+85.8
		51										
Pahoa	0158	473		1458.63	0.69594	1015.12	+.04		-.11	1015.05		+78.42
		40										
Kalapana	0238	513		1480.90	0.69594	1030.62	+.04		-.12	1030.54		+93.91
		62										
Pohoki	0340	575		1488.23	0.69594	1035.72	+.04		-.14	1035.62		+98.99
		133										
Hilo, Gen. Lyman Field	0553	708		1493.00	0.69594	1039.04	+.02		-.17	1038.89		+102.26
								-.29				
Hilo, Gen. Lyman Field	1819	113		1493.33	0.69594	1039.27	+.08	-.29				
		821										
Pahala	2012	30		1382.93	0.69594	962.44	+.04	-.29	-.20	961.99		+25.36
		851										
Hilea	2042	70		1451.77	0.69594	1010.34	+.04	-.29	-.20	1009.89		+73.26
		921										
Naalehu	2152	227		1409.73	0.69594	981.09	+.01	-.29	-.22	980.59		+43.96
		1148										
Kealakekua	20Aug61 0139			1347.67	0.69594	937.90	0.00	-.29	-.28	937.33		+0.70

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: A2C Meyn
INSTRUMENT: # 615
COMPUTED BY: Stinnette
DATE: 29 Sep 61
CHECKED BY: Waring R.
DATE:

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kamuela Airport	18Aug61 1805		13	44.00	0.6929	30.49	+.05			30.54	902.35	
		55										
Makahuna Bridge	1900	55	15	21.37	0.6927	14.80	+.03		-.02	14.81	1040.89	+122.81
		118										
Waipunahina Bridge	2058	173	14	94.37	0.6925	65.35	0.00		-.06	65.29	971.64	+104.04
		79										
Hilo, Gen. Lyman Field	2217	252	14	91.53	0.6925	63.38	0.00		-.08	63.30	971.64	+102.05
		170										
Keaau	19Aug61 0107	422	14	67.80	0.6925	46.95	+.03		-.14	46.84	971.64	+85.59
		51										
Pahoa	0158	473	14	57.30	0.6925	39.68	+.04		-.15	39.57	971.64	+78.32
		40										
Kalapana	0238	513	14	79.37	0.6925	54.96	+.04		-.17	54.83	971.64	+93.58
		62										
Pohoki	0340	575	14	87.17	0.6925	60.37	+.04		-.19	60.22	971.64	+98.97
		133										
Hilo, Gen. Lyman Field	0553	708	14	91.73	0.6925	63.52	+.02		-.23	63.31	971.64	+102.06
Hilo, Gen. Lyman Field	1819		14	92.10	0.6925	63.78	+.08	-.32 / -.32				
		113										
Pahala	2012	821	13	81.53	0.6929	56.49	+.04	-.32	-.26	55.95	902.35	+25.41
		30										
Hilea	2042	851	14	50.50	0.6925	34.97	+.04	-.32	-.27	34.42	971.64	+73.17
		70										
Naalehu	2152	921	14	08.30	0.6925	05.75	+.01	-.32	-.30	05.14	971.64	+43.89
		227										
Kealakekua	20Aug61 0139	1148	13	46.10	0.6929	31.94	0.00	-.32	-.37	31.25	902.35	+0.71

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: Lt Schweninger
COMPUTED BY: Stinnette
DATE: 29Sep61
INSTRUMENT: #617
CHECKED BY: Waring R.
DATE: 20ct61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kealakekua	20Aug61 0139											
		53										
Kona Airport	0232	1201		1455.60	0.69594	1013.01	+.02	-.29	-.29	1012.45		+75.82
		72										
Puuanahulu	0344	1273		1262.70	0.69594	878.76	+.03	-.29	-.31	878.19		-58.44
		31										
Auwaiakeakua Bridge	0415	1304		1274.33	0.69594	886.86	+.03	-.29	-.31	886.29		-50.34
		29										
Kamuela Airport	0444	1333		1346.67	0.69594	937.20	+.04	-.29	-.32	936.63		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER: A2C Meyn
COMPUTED BY: Stinnette
DATE: 29 Sep 61
INSTRUMENT: #615
CHECKED BY: Waring R.
DATE:

1381 FORM JUN 31 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kealakekua	20Aug61 0139											
		53										
		1201										
Kona Airport	0232	72	14	54.27	0.6925	37.58	+.02	-.32	-.39	36.89	971.64	+75.64
		1273										
Pouanahulu	0344	31	12	61.13	0.6937	42.41	+.03	-.32	-.41	41.71	832.98	-58.20
		1304										
Auwaiakeakua Bridge	0415	29	12	72.57	0.6937	50.34	+.03	-.32	-.42	49.63	832.98	-50.28
		1333										
Kamuela Airport	0444		13	45.10	0.6929	31.25	+.04	-.32	-.43	30.54	902.35	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
Lt Schweninger	Stinnette	29 Sep 61
INSTRUMENT	CHECKED BY	DATE
#617	Waring R.	2 Oct 61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kamuela Airport	20Aug61 2049			1347.17	0.69594	937.55	+.07			937.62		
		86										
Waikii	2215	86		1099.70	0.69594	765.33	+.02		-.03	765.32		-172.30
		124										
Hilo, Gen. Lyman Field	21Aug61 0019	210		1494.43	0.69594	1040.03	-.03		-.07	1039.93		+102.31
Hilo, Gen Lyman Field	1856			1495.13	0.69594	1040.52	+.15	-.67 / -.67		-		
		51										
USGS BM Hwy11 2.8 mi. S. of Mtn. View	1947	261		1325.57	0.69594	922.52	+.15	-.67	-.09	921.91		-15.71
		40										
Volcano House	2027	301		1201.50	0.69594	836.17	+.13	-.67	-.10	835.53		-102.09
Volcano House	22Aug61 0020			1201.83	0.69594	836.40	-.03	-.07 / -.74				
		48										
Hwy 11 USGS BM 3640	0108	349		1226.70	0.69594	853.71	-.05	-.74	-.12	852.80		-84.82
		135										
Hilo, Gen. Lyman Field	0323	484		1495.47	0.69594	1040.76	-.05	-.74	-.17	1039.80		+102.18
Hilo, Gen. Lyman Field	1908			1495.67	0.69594	1040.90	+.17	-.36 / -1.10				
		97										
Kamuela Airport	2045	581		1348.90	0.69594	938.75	+.17	-1.10	-.20	937.62		

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
A2C Meyn	Stinnette	29 Sep 61
INSTRUMENT	**CHECKED BY**	**DATE**
# 615	Waring R.	

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Kamuela Airport	20Aug61 2049		13	45.27	0.6929	31.37	+.07			31.44	902.35	
		86										
Waikii	2215	86	10	97.27	0.6950	67.60	+.02		-.04	67.58	694.03	-172.18
		126										
Hilo, Gen. Lyman Field	21Aug61 0021	212	14	92.67	0.6925	64.17	-.03		-.11	64.03	971.64	+101.88
Hilo, Gen. Lyman Field	1856		14	92.77	0.6925	64.24	+.15	-.25 / -.25				
		56										
USGS BM Hwy 11 2.8 miles S. of Mtn. View	1952	268	13	23.25	0.6929	16.11	+.14	-.25	-.14	15.86	902.35	-15.58
		35										
Volcano House	2027	303	11	98.77	0.6945	68.60	+.13	-.25	-.16	68.32	763.53	-101.94
Volcano House	22Aug61 0020		11	99.13	0.6945	68.85	-.03	-.09 / -.34				
		48										
Hwy 11 USGS BM 3640	0108	351	12	23.93	0.6937	16.60	-.05	-.34	-.18	16.03	832.98	-84.78
		135										
Hilo, Gen. Lyman Field	0323	486	14	93.23	0.6925	64.56	-.05	-.34	-.25	63.92	971.64	+101.77
Hilo, Gen. Lyman Field	1908		14	93.43	0.6925	64.70	+.17	-.36 / -.70				
		97										
Kamuela Airport	2045	583	13	46.57	0.6929	32.27	+.17	-.70	-.30	31.44	902.35	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER	COMPUTED BY	DATE
Lt Schweninger	Stinnette	29Sep61
INSTRUMENT	CHECKED BY	DATE
#617	Waring R.	20ct61

1381 FORM JUN 61 0-14

GRAVITY LOOP COMPUTATIONS

STATION	DATE TIME	Δ TIME MIN.	COUNTER	MEAN DIAL D. U.	DIAL FACTOR MGALS/D.U.	MEAN DIAL MGALS	CORRECTIONS TO MEAN DIAL, MGALS 1	2	3	CORR DIAL MGALS	COUNTER MGALS	Δ G. MGALS
Hickam MATS Term	23Aug61 2357	23		1580.83	0.69594	1100.16	+.08			1100.24		
Bishop Museum	24Aug61 0020	23 / 37		1608.53	0.69594	1119.44	+.06		-.01	1119.49		+ 19.25
Hickam MATS Term	0057	60		1580.97	0.69594	1100.26	+.01		-.03	1100.24		
Hickam MATS Term	23Aug61 2357	23	15	78.40	0.6927	54.31	+.08			54.39	1040.89	
Bishop Museum	24Aug61 0020	23 / 37	16	06.07	0.6933	04.21	+.06		+.02	04.29	1110.16	+ 19.17
Hickam MATS Term	0057	60	15	78.43	0.6927	54.33	+.01		+.05	54.39	1040.89	

1. EARTH TIDE
2. DRIFT BETWEEN TRIPS
3. DRIFT DURING TRIPS

OBSERVER A2C Meyn #615
Lt Schweninger #617

COMPUTED BY Stinnette — DATE 29 Sep 61

INSTRUMENT #615 & #617

CHECKED BY Waring R. — DATE 2 Oct 61

1381 FORM JUN 61 0-14

APPENDIX C

BASE STATION DESCRIPTIONS

PRINCIPAL FACTS FOR DETAIL OBSERVATIONS

SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
U. S. A.	Bishop Museum Pendulum	Hawaii Oaho Island

☐ REFERENCE ☐ DETAIL	NEAREST CITY	LATITUDE	LONGITUDE
Gravity Base	Honolulu	22 ° 20.2 ′ " N	157 ° 52.4 ′ " W

STATION ELEVATION FT/MTR	PROBABLE ACCURACY
Unknown	

SOURCE OF INFORMATION FOR:

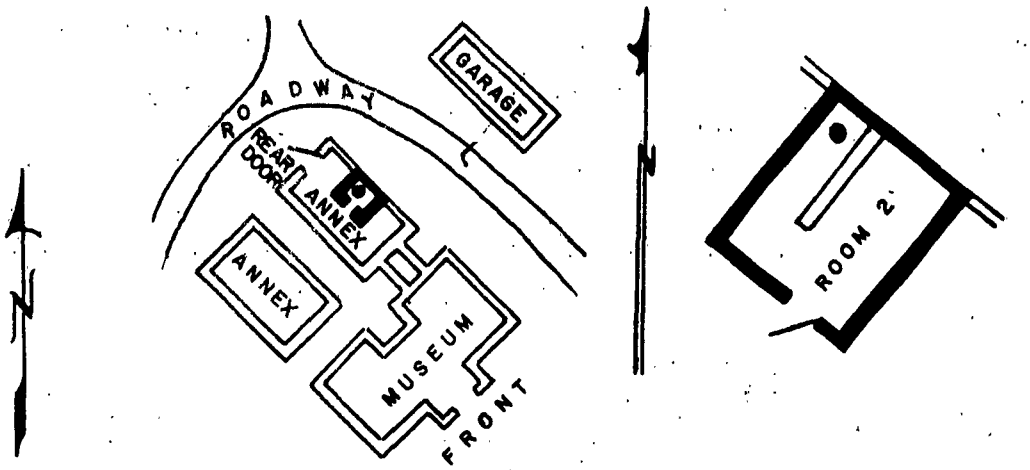
LATITUDE & LONGITUDE	ELEVATION	DATUM
W. H. O. I. Ref. 60-26, July 1960		

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
A/2c Meyn Lt. Schweninger	August 1961	1/Lt. J. B. Schweninger

DESCRIPTION

Station is in room 2 on the ground floor of the Administration and Research Annex (northeast annex building at the rear of the museum). The station is in the north corner of room 2 at floor level which is about 3 feet below the level of the ground immediately outside.

SKETCH



SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
USA	Hickam MATS Term	Hawaiian Islands
	NEAREST CITY: Honolulu	LATITUDE: 21° 18.9 N "
		LONGITUDE: 158° 04.5 W"
STATION ELEVATION FT/MTR: 21	ESTIMATED ACCURACY ±	

SOURCE OF INFORMATION FOR :

LATITUDE & LONGITUDE	ELEVATION	DATUM
Ref. #60-26 Woods Hole Oceanographic Inst.	Same as Position	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
Lt Schweninger & A2C Meyn	Aug 61	1/Lt J. B. Schweninger

DESCRIPTION

Readings were taken beside customs door on field side of waiting room at the MATS Base Terminal.

SKETCH

1381 FORM MAR 58 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY: USA	STATION DESIGNATION: Berth M-3		STATE OR PROVINCE: Hawaiian Islands
	NEAREST CITY: Pearl City	LATITUDE: 21° 23 ' ± 2'	LONGITUDE: 157° 57 ' ± 2'
STATION ELEVATION FT/MTR: 10		ESTIMATED ACCURACY ±: 10	
SOURCE OF INFORMATION FOR :			
LATITUDE & LONGITUDE: USC&GS Triangulation Diagram		ELEVATION: guess	DATUM:
OBSERVED BY: A2C Meyn	MONTH & YEAR: Aug 61	CHIEF OF TEAM: Lt J. B. Schweninger	

DESCRIPTION

SKETCH

1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

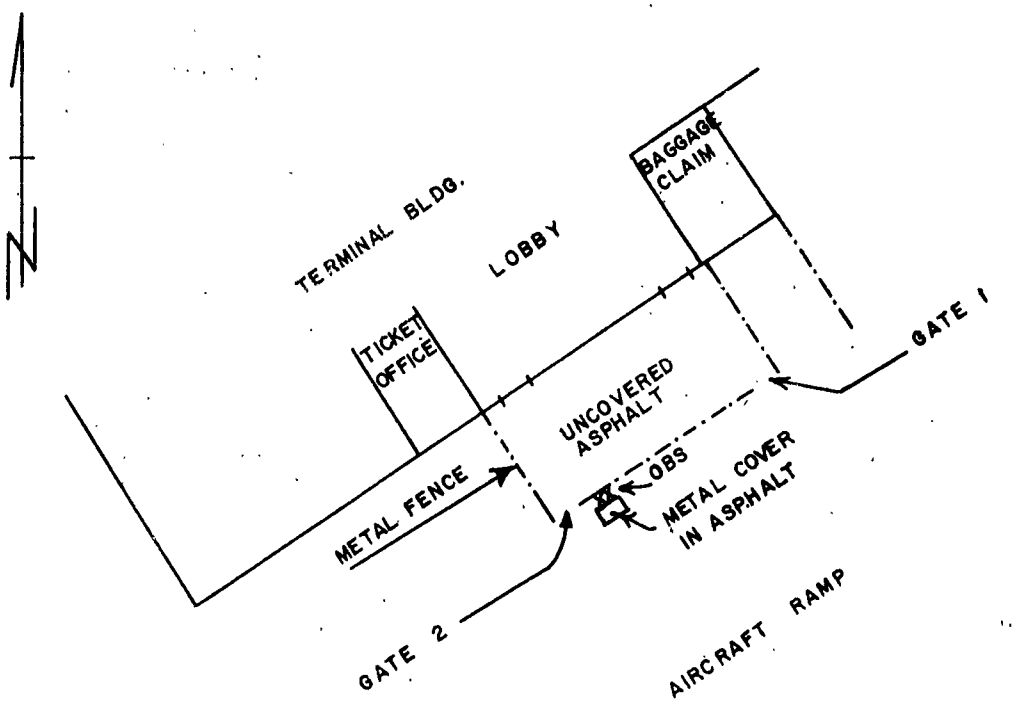
COUNTRY: USA	STATION DESIGNATION: Molokai Airport	STATE OR PROVINCE: Molokai Island Hawaii	
Gravity Base	NEAREST CITY: Kualapuu	LATITUDE: 21° 09' N "	LONGITUDE: 157° 06' W "
STATION ELEVATION FT/MTR: 441	ESTIMATED ACCURACY ±: plus or minus 20		

SOURCE OF INFORMATION FOR :

LATITUDE & LONGITUDE: Flight Information Publications enroute supplement	ELEVATION: Same	DATUM:
OBSERVED BY: A2C Meyn, 1/Lt Schweninger	MONTH & YEAR: Aug 1961	CHIEF OF TEAM: Lt Schweninger

DESCRIPTION: Observations were made on the asphalt surface on the field side of the fence at gate #2 of the Molokai Airport.

SKETCH



1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
U S A	Lanai Airport	Lanai Island Hawaii

	NEAREST CITY	LATITUDE	LONGITUDE
Gravity Base	Lanai City	20 ° 48 ' "	156 ° 57 ' W "

STATION ELEVATION FT/~~MTR~~	ESTIMATED ACCURACY ±
1315	plus or minus 50 ft

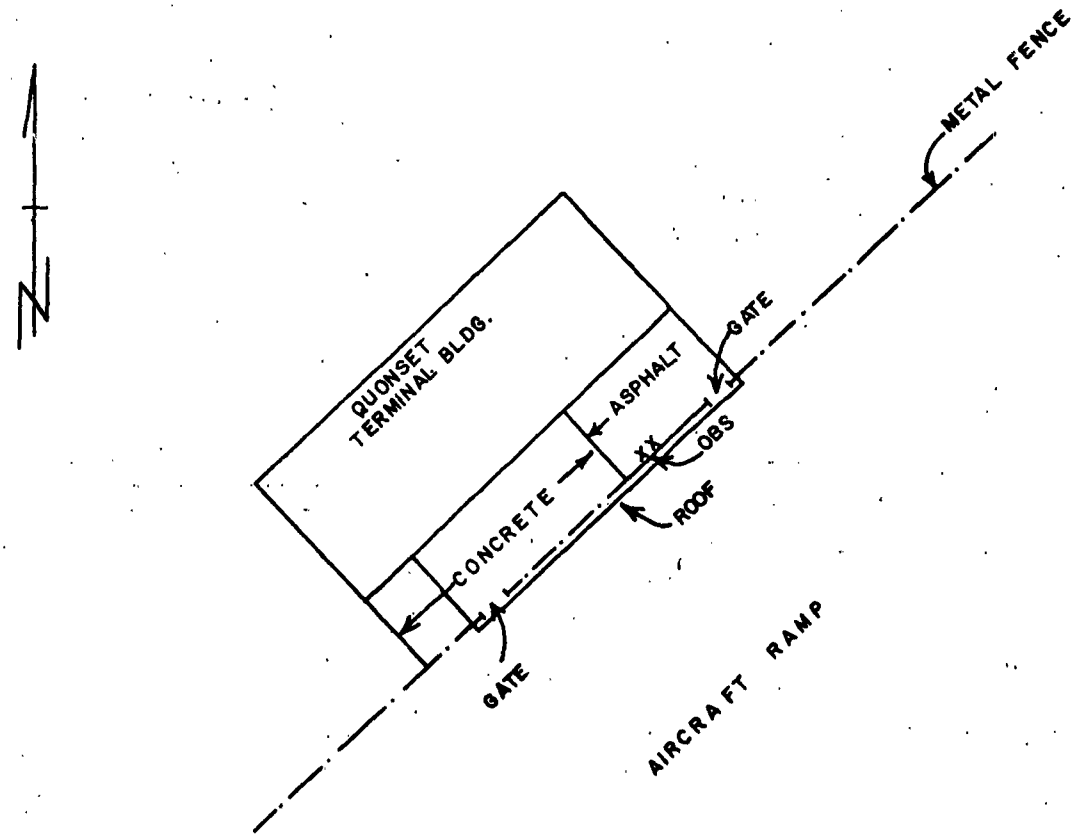
SOURCE OF INFORMATION FOR 1

LATITUDE & LONGITUDE	ELEVATION	DATUM
Flt info pub enroute supplement	Same	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
A2C Meyn Lt Schweninger	Aug 61	1/Lt Schweninger

DESCRIPTION Observations were made on the asphalt pavement in front of the Hawaiian Airline terminal next to the fence and a concrete sidewalk.

SKETCH



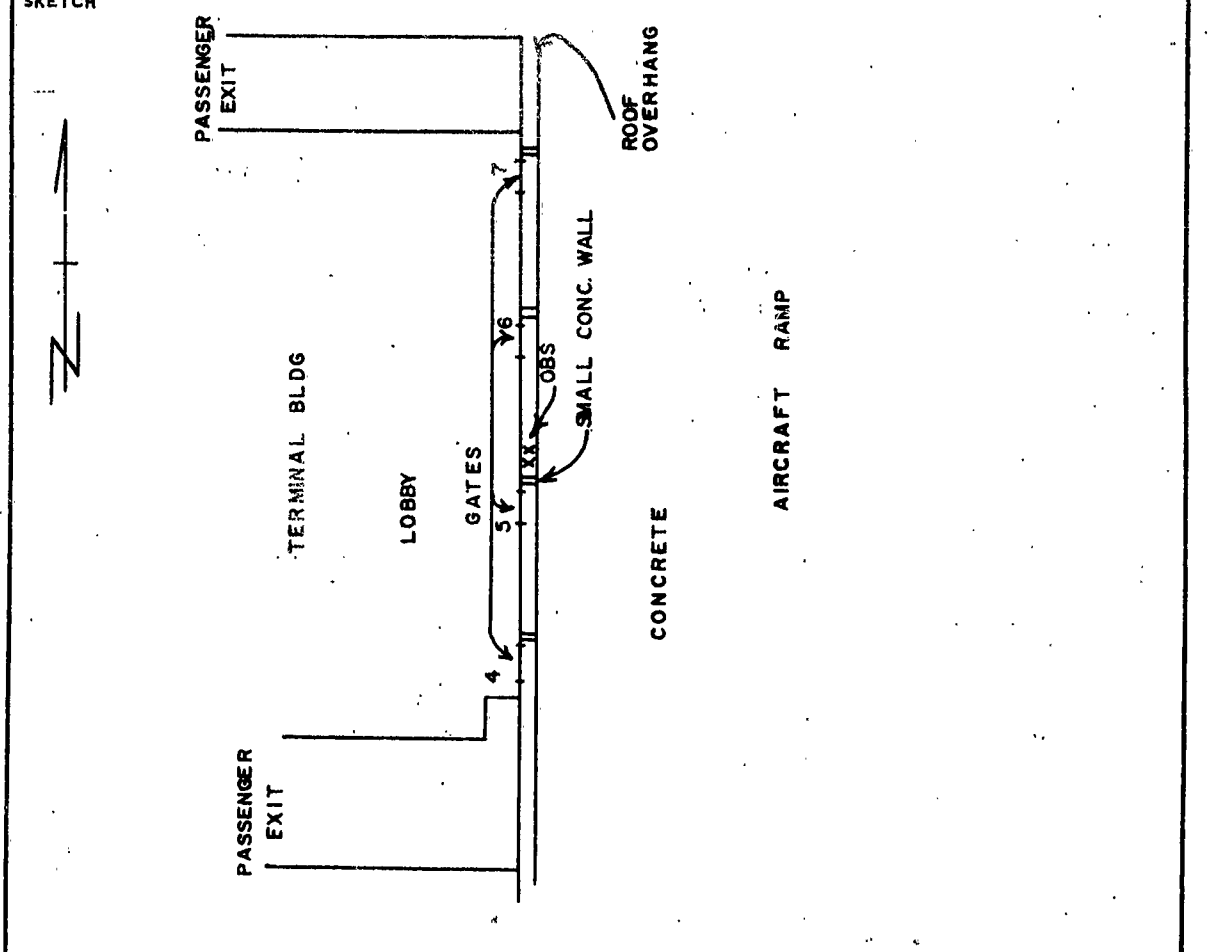
1381 FORM MAR 62 0-18 REPLACES 1967 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY: USA	STATION DESIGNATION: ✓Kahului Airport	STATE OR PROVINCE: Maui Island Hawaii	
Gravity Base	NEAREST CITY: Kakului	LATITUDE: 20° 54′ N′	LONGITUDE: 156° 26′ W″
STATION ELEVATION FT/~~MTR~~: 59	ESTIMATED ACCURACY ±: Plus or Minus 20 Ft		
SOURCE OF INFORMATION FOR :			
LATITUDE & LONGITUDE: Flight Information Publications Enroute Supplement	ELEVATION: Same	DATUM:	
OBSERVED BY: A2C Meyn and 1st Lt. J. B. Schweninger	MONTH & YEAR: Aug 61	CHIEF OF TEAM: 1st Lt., J. B. Schweninger	

DESCRIPTION: Observations were made on the concrete ramp next to a concrete wall at Gate #5 and against the outside wall of the terminal building at Kahului Apt.

SKETCH



1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
USA	Hana Airport	Maui Island Hawaii

	NEAREST CITY	LATITUDE	LONGITUDE
Gravity Base	Hana	20° 48' N "	156° 01' W "

STATION ELEVATION FT/~~MTR~~	ESTIMATED ACCURACY ±
77	Plus or Minus 20 Ft

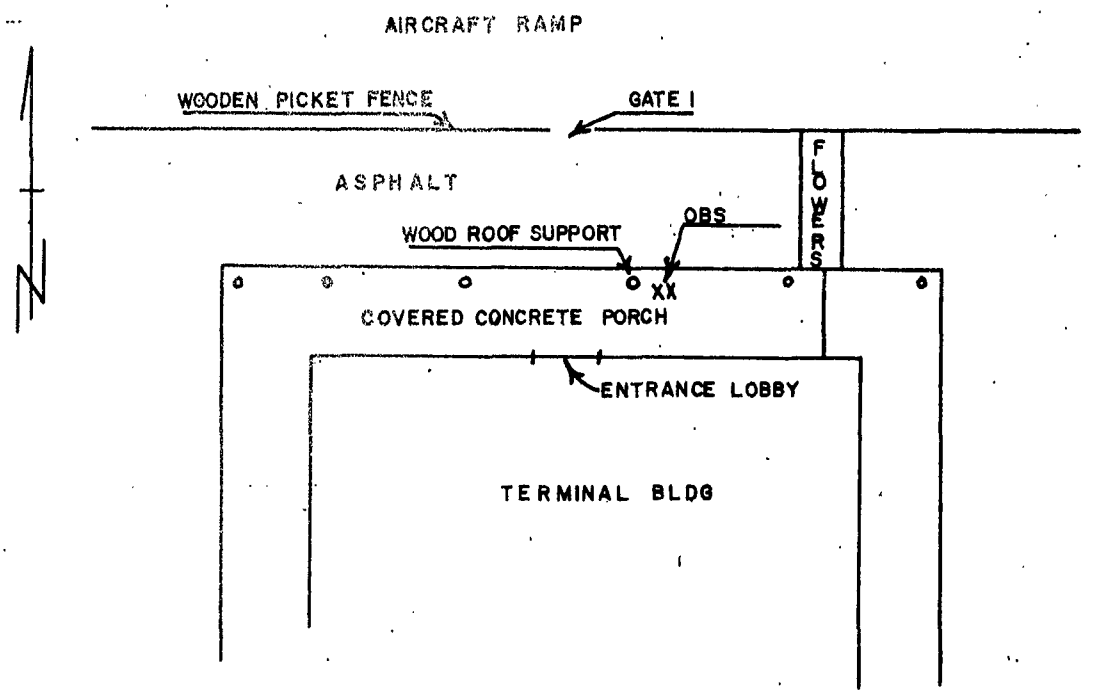
SOURCE OF INFORMATION FOR :

LATITUDE & LONGITUDE	ELEVATION	DATUM
Flight Information Publication Enroute Supplement	Same	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
A2C Meyn and 1/Lt Schweninger	Aug [illegible]	1/Lt Schweninger

DESCRIPTION Observations were made on a concrete slab outside the field entrance to the Nana terminal and to left of a wooden roof support as you face the terminal.

SKETCH



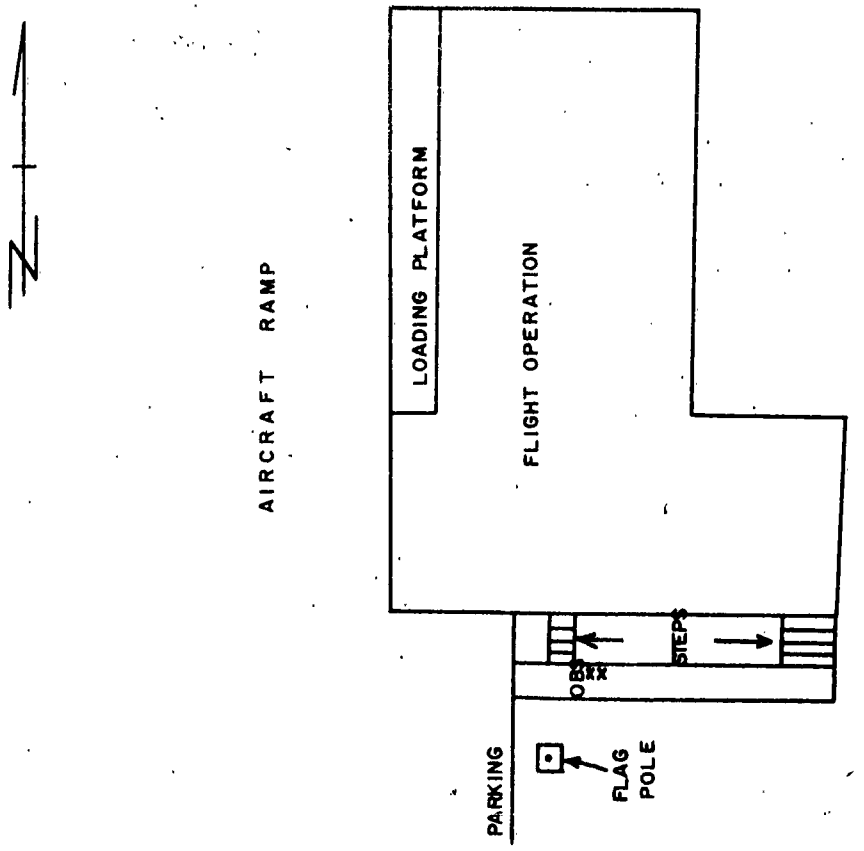
1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY: USA	STATION DESIGNATION: Bonham A. L. F.	STATE OR PROVINCE: Hawaii Kauai Island	
Gravity Base	NEAREST CITY: Mana	LATITUDE: 22° 02' N"	LONGITUDE: 159° 47' W"
STATION ELEVATION FT/MM: 14	ESTIMATED ACCURACY ±: plus or minus 10		
SOURCE OF INFORMATION FOR :			
LATITUDE & LONGITUDE: Flight Information Enroute Supplement	ELEVATION: Same	DATUM:	
OBSERVED BY: A2C Meyn 1/Lt Schweninger	MONTH & YEAR: Aug 61	CHIEF OF TEAM: 1/Lt Schweninger	

DESCRIPTION: Observations were made on the concrete sidewalk on the south side of the flight operations at Bonham Auxilary Landing Field. The field is operated by the Navy.

SKETCH



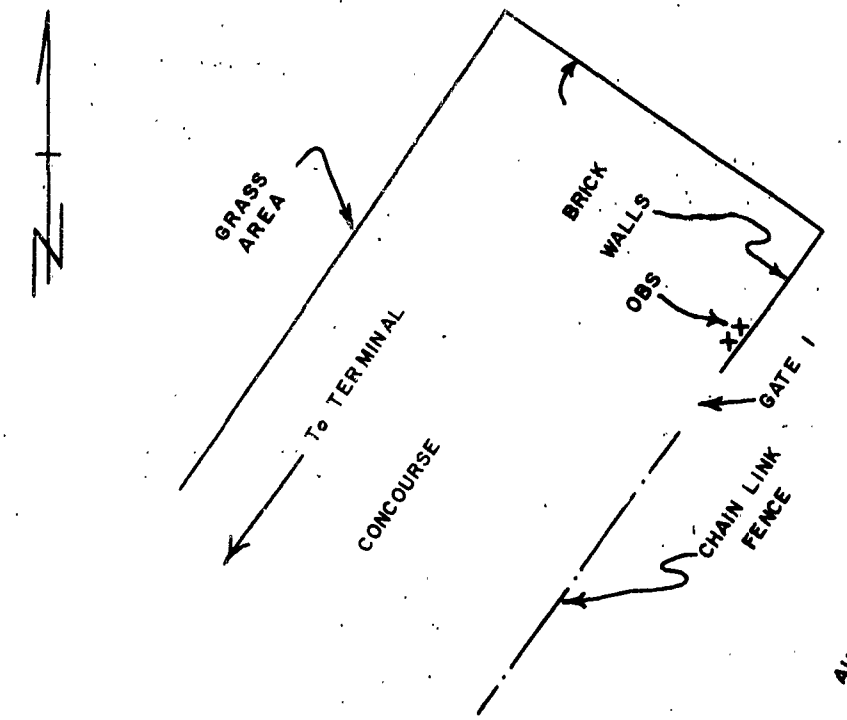
1381 FORM 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY: USA	STATION DESIGNATION: Lihue Airport		STATE OR PROVINCE: Kauai Island Hawaii
Gravity Base	NEAREST CITY: Lihue	LATITUDE: 21° 59' N "	LONGITUDE: 159° 21' W "
STATION ELEVATION FT/~~MTR~~: 148	ESTIMATED ACCURACY ±: Plus or Minus 20		
SOURCE OF INFORMATION FOR :			
LATITUDE & LONGITUDE: Flight Information Publications enroute Supplement	ELEVATION: Same		DATUM
OBSERVED BY: 1/Lt Schweninger, AGC Meyn and	MONTH & YEAR: Aug 1961	CHIEF OF TEAM: 1/Lt Schweninger	

DESCRIPTION: Observations were made inside the concourse against the brick wall at Gate #1 of the Lihue Municipal Airport.

SKETCH



1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
U. S. A.	Upolu Point Airport	Hawaii Island of Hawaii

	NEAREST CITY	LATITUDE	LONGITUDE
Gravity Base	Hawi	20 ° 16 ' " N	155 ° 52 ' " W

STATION ELEVATION FT/~~MTR~~	ESTIMATED ACCURACY ±
94	20 ft.

SOURCE OF INFORMATION FOR :

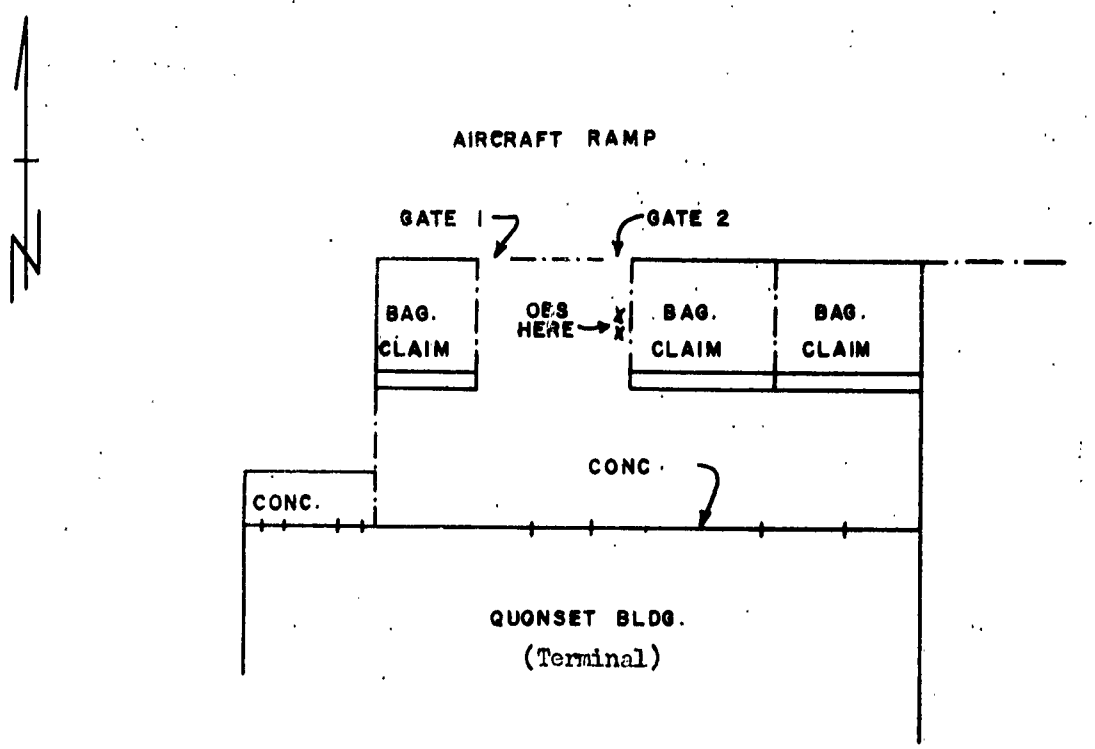
LATITUDE & LONGITUDE	ELEVATION	DATUM
USAF Flight Information Publication	Enroute Supplement	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
A/2c Meyn Lt. Schweninger	August 1961	1/Lt. J. B. Schweninger

DESCRIPTION

Observations were made at the Upolu Point Airport terminal building on the conc. sidewalk next to the chain link fence of the baggage claim at gate 2. This is an open area covered by a roof.

SKETCH



1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
USA	Kona Airport	Hawaii Island of Hawaii

	NEAREST CITY	LATITUDE	LONGITUDE
Gravity Base	Kailua	19 ° 39 ' N "	156 ° 01 ' W "

STATION ELEVATION FT ~~MTN~~	ESTIMATED ACCURACY ±
16	Plus or Minus 10 Ft

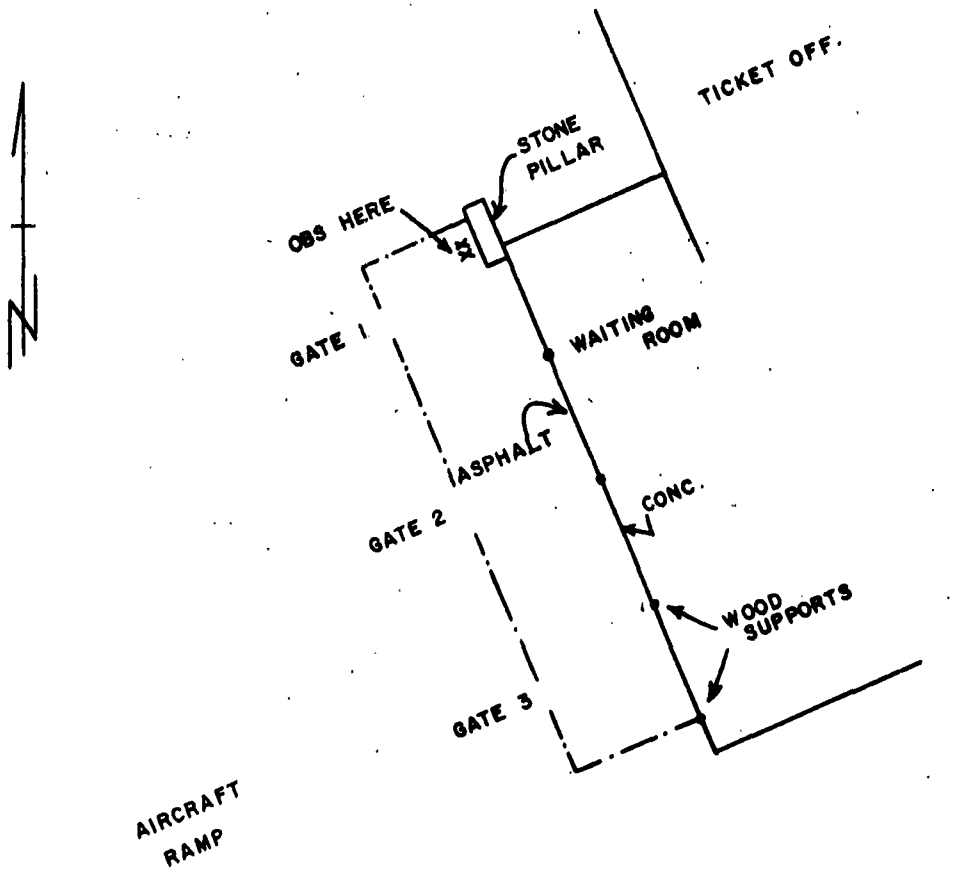
SOURCE OF INFORMATION FOR :

LATITUDE & LONGITUDE	ELEVATION	DATUM
Flight Information Publications Enroute Supplement	Same	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
A2C Meyn and 1st Lt J. B. Schweninger	AUG 61	1st Lt. J. B. Schweninger

DESCRIPTION Observations were made on the asphalt floor next to a stone pillar opposite Gate #1. The station is under the corner of a overhanging roof.

SKETCH



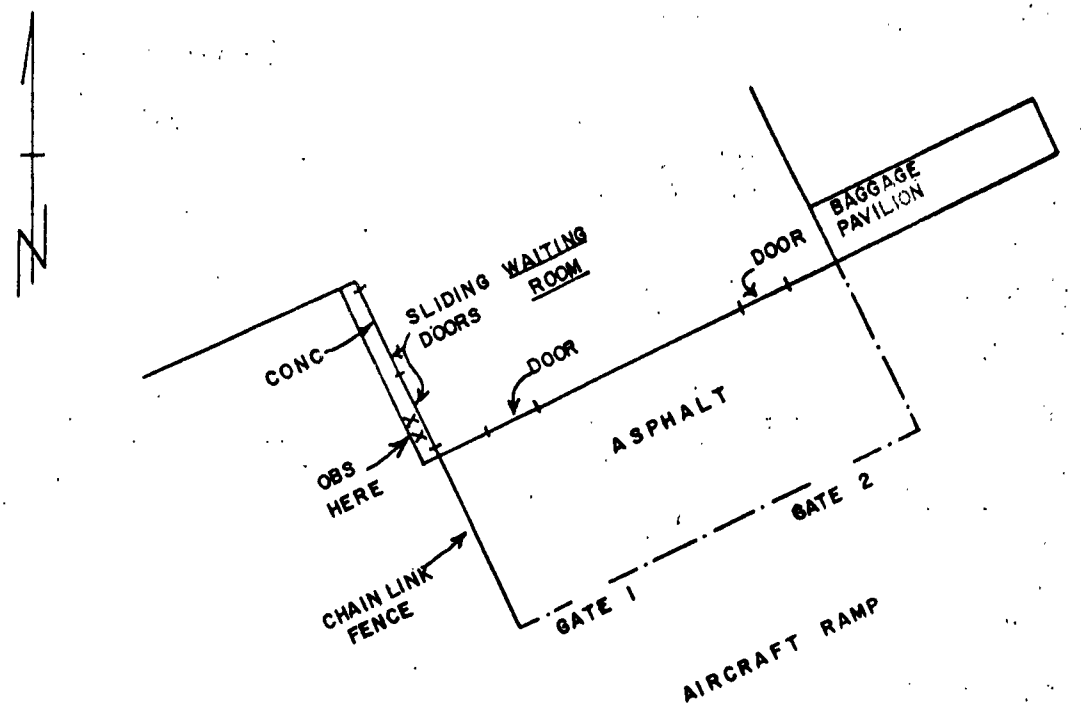
1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY: USA	STATION DESIGNATION: Kamuela Airport	STATE OR PROVINCE: Hawaii Island of Hawaii	
Gravity Base	NEAREST CITY: Waimea	LATITUDE: 20° 01' N"	LONGITUDE: 155° 41' W "
STATION ELEVATION FT/~~MTR~~: 2671	ESTIMATED ACCURACY ±: Plus or Minus 50 Ft		
SOURCE OF INFORMATION FOR :			
LATITUDE & LONGITUDE: Flight Information Publication Enroute Supplement	ELEVATION: Same	DATUM:	
OBSERVED BY: A2C Meyn and 1/Lt Schweninger	MONTH & YEAR: Aug 61	CHIEF OF TEAM: 1/Lt J. B. Schweninger	

DESCRIPTION: Observations were made on the concrete floor which extends 8 inches beyond the sliding doors at the side of the waiting room at the corner of the Building near the door to Gate #1. The station is under a overhanging roof.

SKETCH



1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
USA	General Lyman Field	Hawaii

	NEAREST CITY	LATITUDE	LONGITUDE
Gravity Base	Hilo	19° 44' N "	155° 04' W "

STATION ELEVATION FT	ESTIMATED ACCURACY
34'	±10

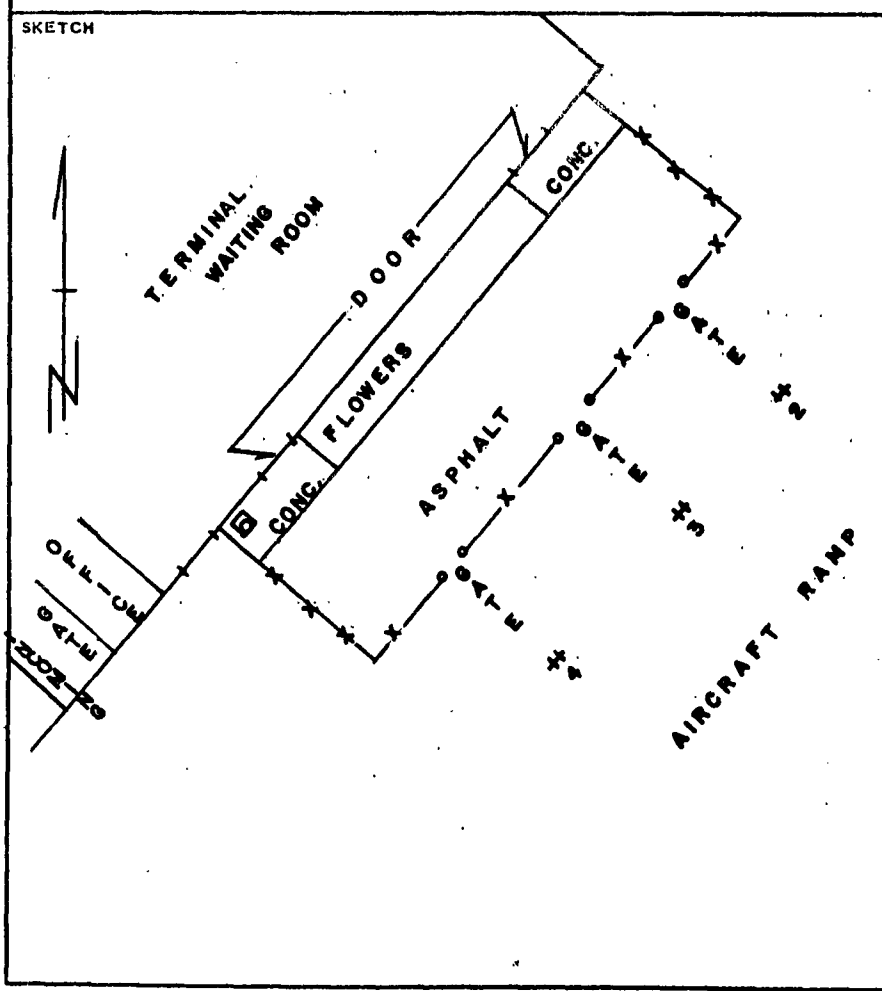
SOURCE OF INFORMATION FOR :

LATITUDE & LONGITUDE	ELEVATION	DATUM
Enroute Supplement Flight Information Publication	Enroute Supplement	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
1st Lt Schweninger & A2C Meyn	Aug 1961	1st Lt J. B. Schweninger

DESCRIPTION Observations were made on the concrete floor outside the terminal building next to the door opposite Gate 4. The site is under a overhanging roof.

SKETCH



SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
USA	Laysan Island	Hawaiian Islands

☐ REFERENCE ☒ DETAIL	NEAREST CITY	LATITUDE	LONGITUDE
		25 ° 46 ' "	171 ° 45 ' "

STATION ELEVATION FT/~~MPR~~	PROBABLE ACCURACY
26' - 9"	± 5'

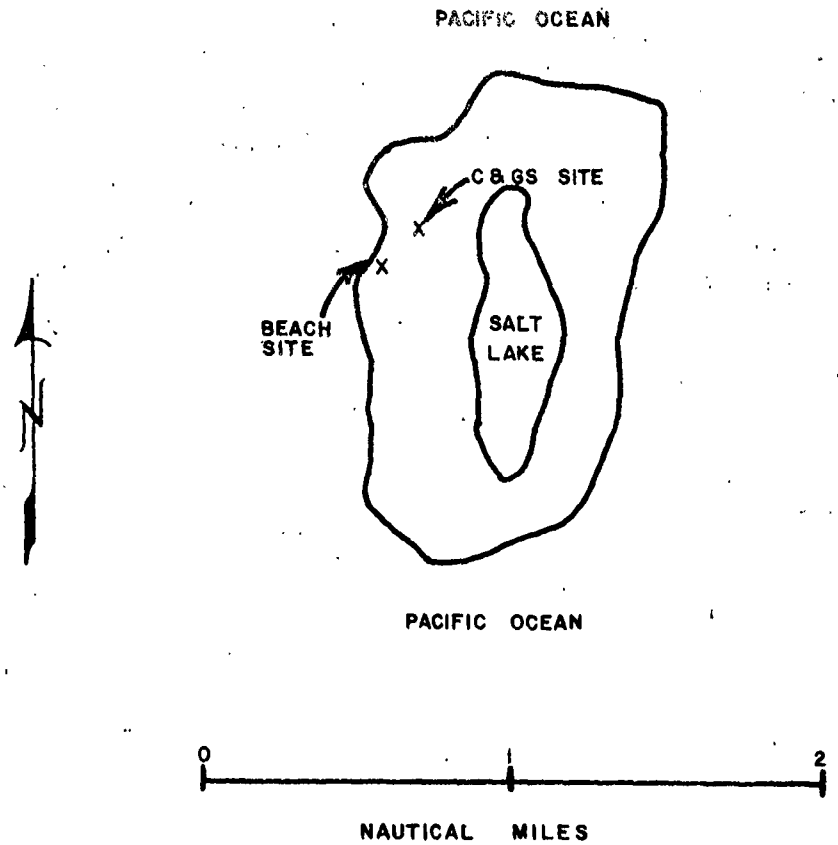
SOURCE OF INFORMATION FOR:

LATITUDE & LONGITUDE	ELEVATION	DATUM
USC&GS Chart #4186	Hand Leveling using mean tide at 2140 GCT on 10 Jul 61	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
Lt Schweninger & A/2C Meyn	July 1961	1/Lt J B Schweninger

DESCRIPTION Observations were made at the USC&GS trianglation stationstamped "LAYS 1961" . The station is approximately 200' east of the west beach. An observation was also made at the top of the west beach approximately 40' from the waters edge 10' west of a US Wildlife refuge sign. The elevation here is 11' - 1".

SKETCH



1381 FORM MAR 61 23 REPLACES FREVIOUS EDITION OF THIS FORM AND 1381 FORM 31

SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
USA	Lisianski Island	Hawaiian Islands
☐ REFERENCE ☒ DETAIL	NEAREST CITY	LATITUDE 26 ° 04 ' " / LONGITUDE 173 ° 58 ' "
STATION ELEVATION FT/~~MTR~~ 16' - 0"	PROBABLE ACCURACY ± 5'	

SOURCE OF INFORMATION FOR:

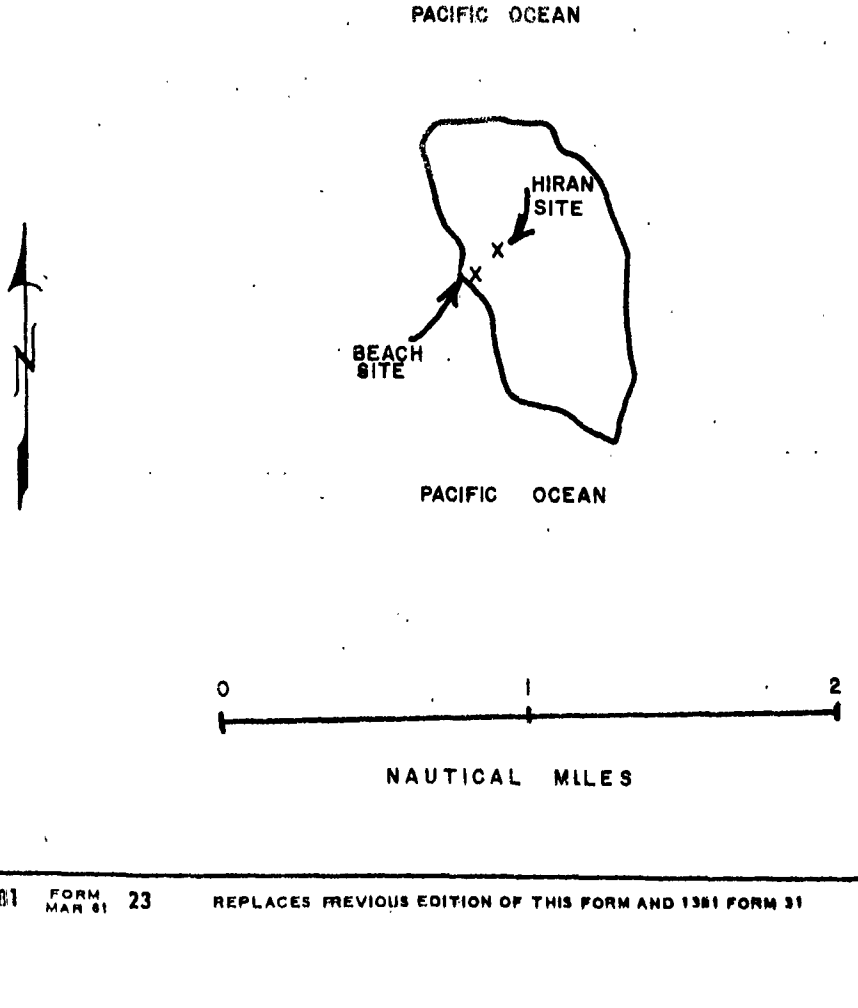
LATITUDE & LONGITUDE	ELEVATION	DATUM
USC&GS Chart #4186	Hand leveling using mean tide at 2220 GCT on 12 Jul 61	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
Lt Schweninger & A/2C Meyn	July 1961	1/Lt J B Schweninger

DESCRIPTION Observations were made at the USC&GS trianglation station stamped "Lisianski 1961". The station is approximately 400' east of the west beach.

An observation was also made at the top of the west beach approximately 30' from the waters edge next to a US Wildlife refuge sign. The elevation here is 8' - 0".

SKETCH



SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
U. S. A.	Pearl and Hermes Reef	Hawaiian Islands

☐ REFERENCE ☒ DETAIL	NEAREST CITY	LATITUDE	LONGITUDE
		27 ° 46 ' "	175 °48 ' "

STATION ELEVATION FT/~~METERS~~	PROBABLE ACCURACY
5' - 6"	± 2'

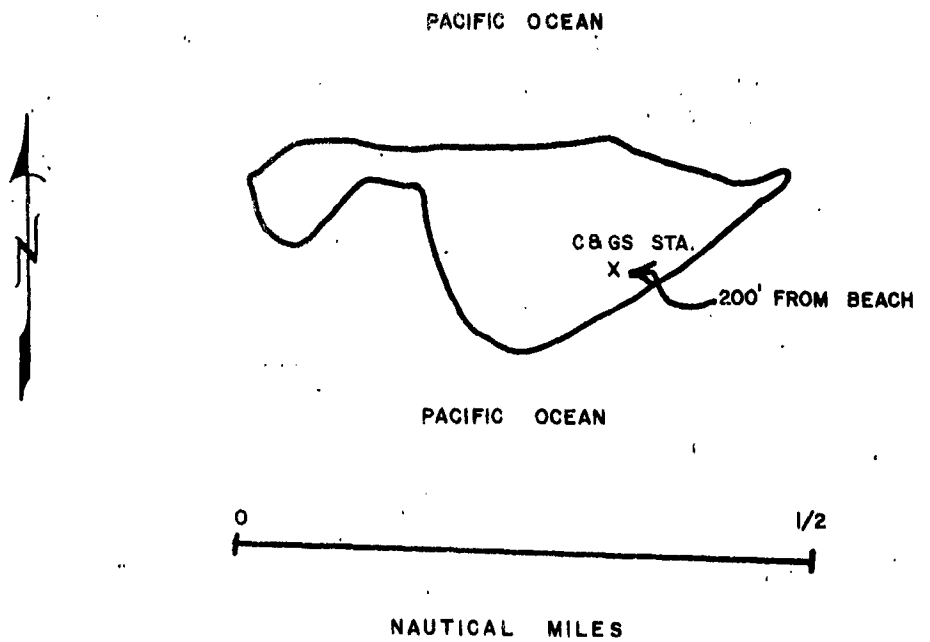
SOURCE OF INFORMATION FOR:

LATITUDE & LONGITUDE	ELEVATION	DATUM
USC&GS Chart #4175	Hand Leveling using mean tide at 0005 GCT on 14 Jul 61	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
Lt Schweninger and A/2C Meyn	Jul 61	1/Lt Schweninger

DESCRIPTION Observations were made at a USC&GS triangulation mark stamped "PEARL 1961". The station is approximately 200' N.W. of the S.E. beach of Southeast Island of Pearl and Hermes Reef.

SKETCH



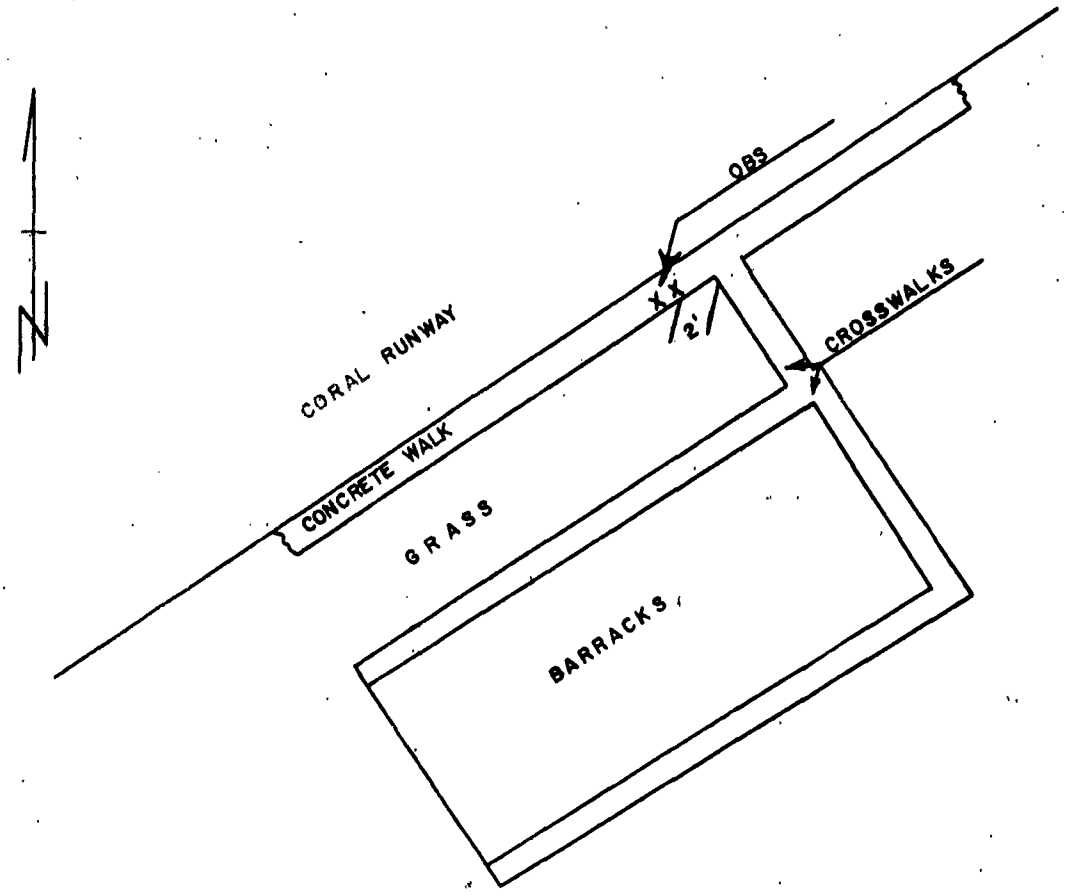
1381 FORM MAR 61 23 ~~REPLACES PREVIOUS EDITION OF THIS FORM AND 1381 FORM 31~~

SURVEY STATION DESCRIPTION

COUNTRY USA	STATION DESIGNATION French Frigate Shoals	STATE OR PROVINCE Hawaiian Islands
Gravity Base	NEAREST CITY	LATITUDE 23 ° 52' N" / LONGITUDE 166 ° 17 ' W"
STATION ELEVATION FT/M/F 6 Ft	ESTIMATED ACCURACY ± Plus or Minus 2 Ft	
SOURCE OF INFORMATION FOR :		
LATITUDE & LONGITUDE Flight Information Publication Enroute Supplement	ELEVATION Same	DATUM
OBSERVED BY A2C Meyn and 1st Lt. J. B. Schweninger	MONTH & YEAR Jul 61	CHIEF OF TEAM 1st Lt. J. B. Schweninger

DESCRIPTION Observations were made at the US Coast Guard Loran Station, Tern Island, French Frigate Shoals, on the concrete sidewalk next to the coral runway in front of the northeast corner of the barracks building.

SKETCH



1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
USA	Johnston Island	USA

	NEAREST CITY	LATITUDE	LONGITUDE
Gravity Base		16° 44' N"	169° 31 ' W "

STATION ELEVATION FT/~~M~~	ESTIMATED ACCURACY ±
7	Plus or Minus 2 Ft

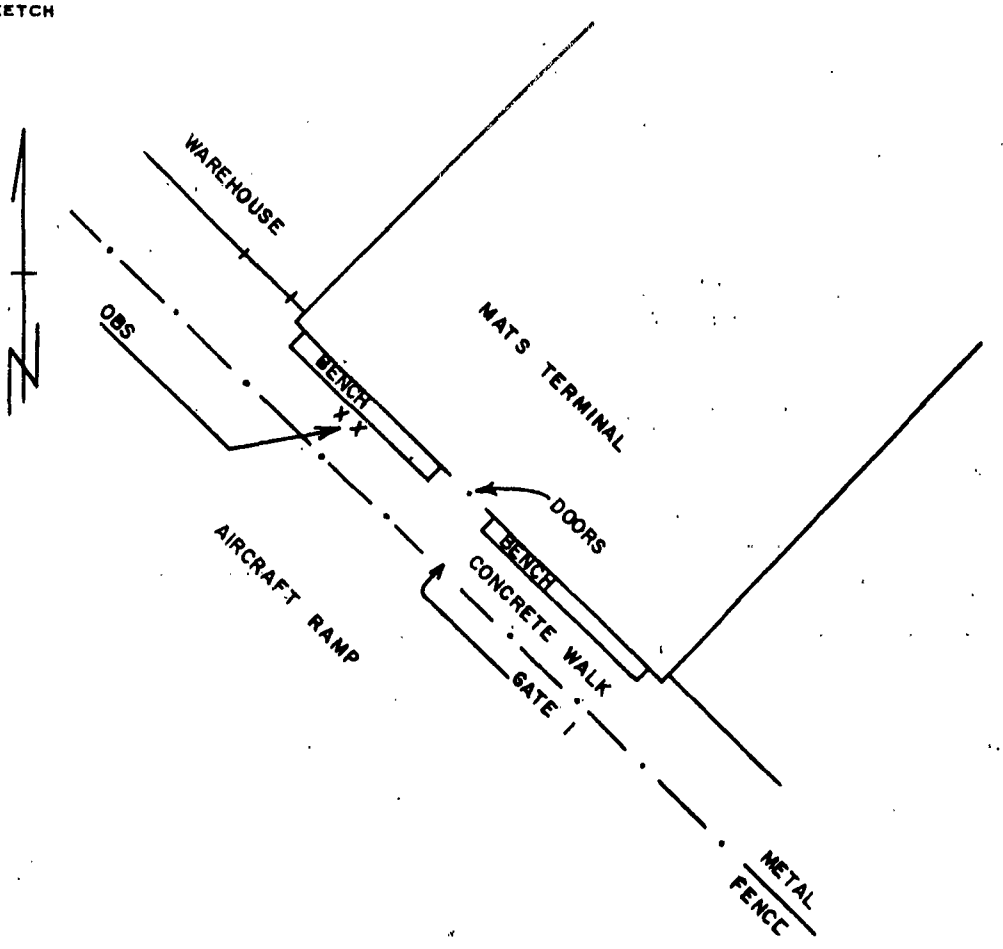
SOURCE OF INFORMATION FOR :

LATITUDE & LONGITUDE	ELEVATION	DATUM
Flight Information Publication Enroute Supplement	Same	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
A2C Meyn and 1st Lt J. B. Schweninger	Jul 61	1st Lt. J. B. Schweninger

DESCRIPTION Observations were made at Dr. Woollards station in front of the MATS terminal building on the concrete walk 12 feet to the left of the entrance door to the terminal lobby.

SKETCH



1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

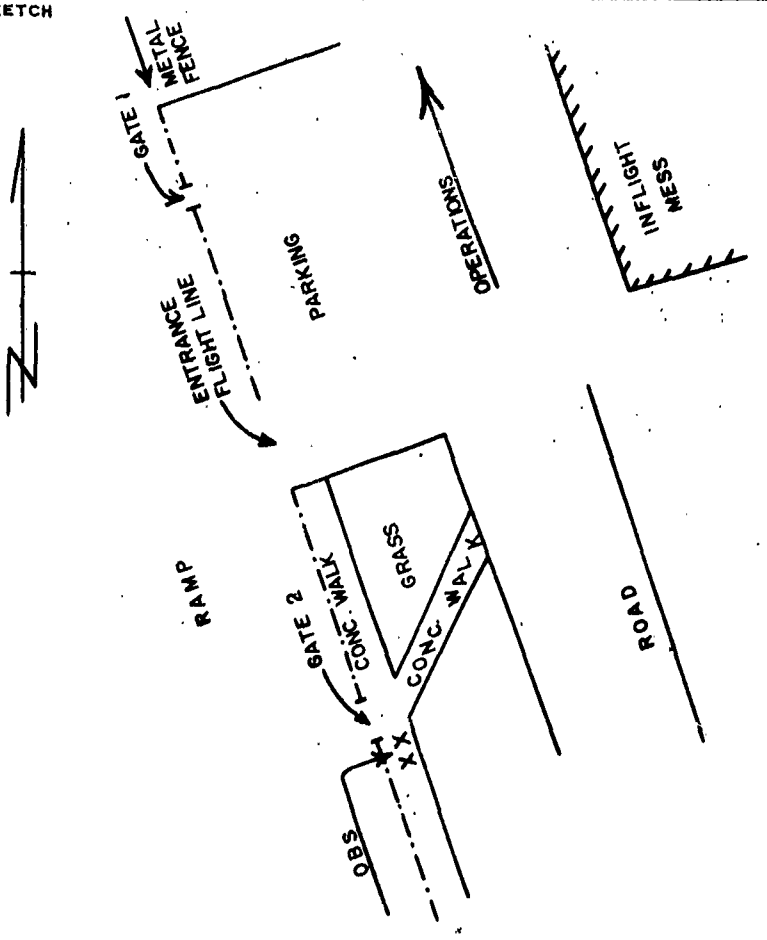
COUNTRY: USA	STATION DESIGNATION: Midway Gate #2		STATE OR PROVINCE: Hawaiian Islands
Gravity Base	NEAREST CITY: Midway Island	LATITUDE: 28° 12' N"	LONGITUDE: 177° 23' W"
STATION ELEVATION FT/~~MPA~~: 13		ESTIMATED ACCURACY ±: Plus or Minus 5 Ft	

SOURCE OF INFORMATION FOR :

LATITUDE & LONGITUDE: Flight Information Publication Enroute Supplement	ELEVATION: Same	DATUM:
OBSERVED BY: A2C Meyn and 1/Lt Schweninger	MONTH & YEAR: Jul 61	CHIEF OF TEAM: 1st Lt J. B. Schweninger

DESCRIPTION: Observations were made on the concrete sidewalk next to Gate #2 at the Naval Air Terminal, Sand Island, Midway. The station is to the left of Gate #2 as you face the aircraft ramp.

SKETCH



1381 FORM MAR 62 0-18 REPLACES 1381 FORM 23 WHICH MAY BE USED

SURVEY STATION DESCRIPTION

COUNTRY	STATION DESIGNATION	STATE OR PROVINCE
USA	Midway Old Operations Bldg	Hawaiian Islands

☒ REFERENCE ☐ DETAIL	NEAREST CITY	LATITUDE	LONGITUDE
	Midway Island	28° 12' "	177° 23' "

STATION ELEVATION FT/~~METR~~	PROBABLE ACCURACY
13'	± 5'

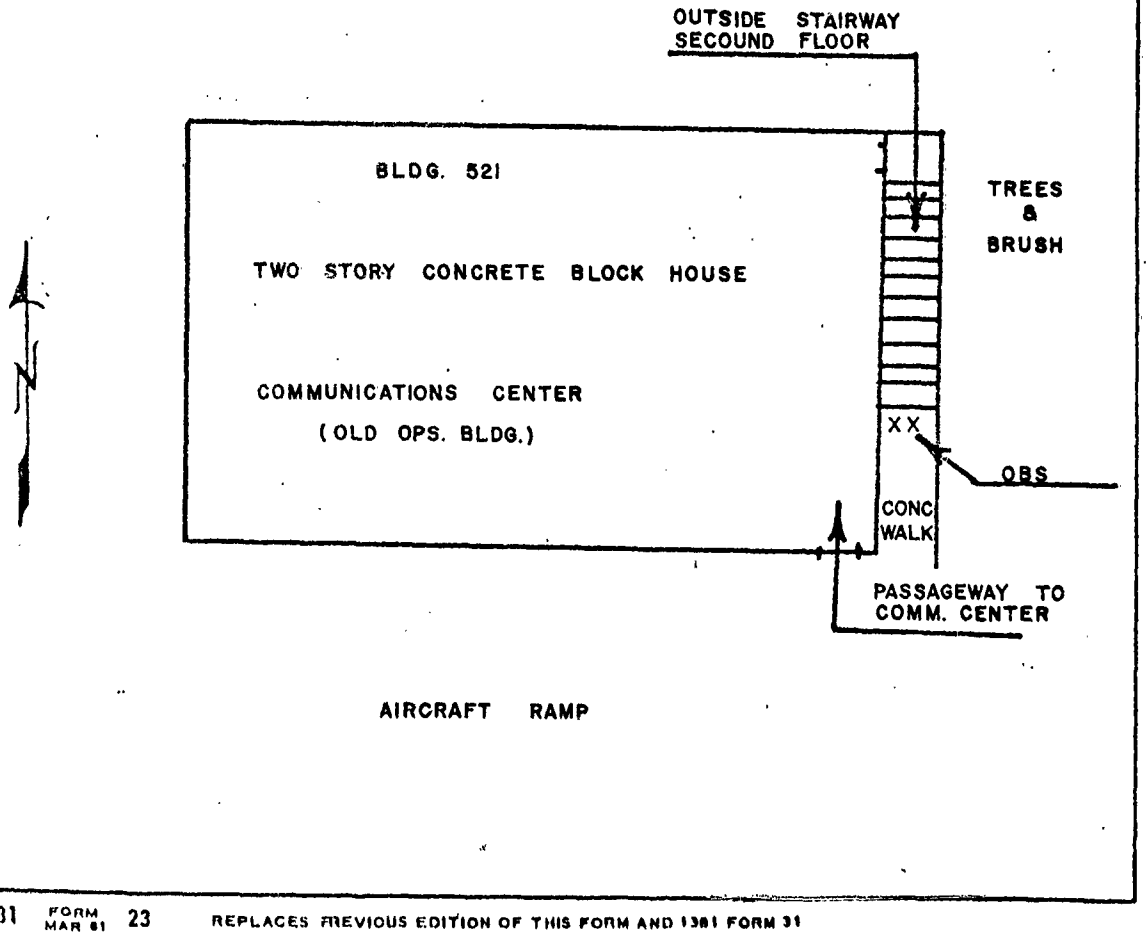
SOURCE OF INFORMATION FOR:

LATITUDE & LONGITUDE	ELEVATION	DATUM
Base Operations	Base Operations	

OBSERVED BY	MONTH & YEAR	CHIEF OF TEAM
Lt Schweninger & A/2C Meyn	July 1961	1/Lt J B Schweninger

DESCRIPTION Observations were made at Dr. Woollard's Station at the base of the concrete steps leading to the old base operations building at the Navy Air Station on Sand Island, Midway. This building is now the communications center.

SKETCH



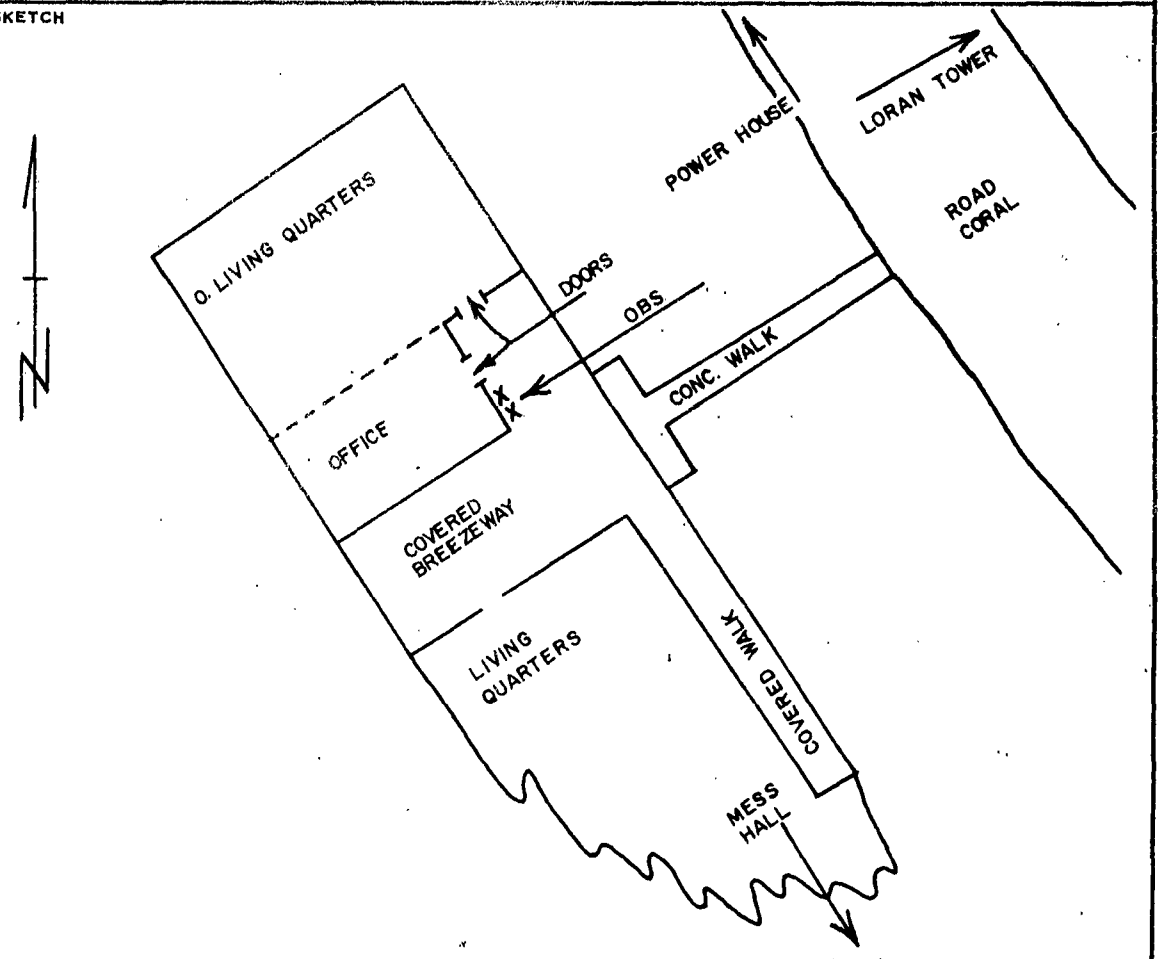
1381 FORM MAR 61 23 REPLACES PREVIOUS EDITION OF THIS FORM AND 1381 FORM 31

SURVEY STATION DESCRIPTION

COUNTRY USA	STATION DESIGNATION Kure Island	STATE OR PROVINCE Hawaiian Islands	
Gravity Base	NEAREST CITY	LATITUDE 28°23.5' N"	LONGITUDE 178° 18' W"
STATION ELEVATION FT/~~MTR~~ 7	ESTIMATED ACCURACY ± Plus or Minus 3 Ft		
SOURCE OF INFORMATION FOR :			
LATITUDE & LONGITUDE Flight Information Publication Enroute Supplement	ELEVATION Same	DATUM	
OBSERVED BY A2C Meyn and 1st Lt. J. B. Schweninger	MONTH & YEAR Jul 61	CHIEF OF TEAM 1st Lt J. B. Schweninger	

DESCRIPTION Observations were made on the concrete floor to the left of the office door of the US Coast Guard Loran Station on Kure Island. The office is at the north end of the barracks building.

SKETCH



1361 FORM MAR 62 0-18 REPLACES 1361 FORM 23 WHICH MAY BE USED

PRINCIPAL FACTS FOR DETAIL OBSERVATIONS

COUNTRY USA - Hawaiian Islands

NAME OF GRAVITY BASE: Hickam MATS Terminal, Oahu

VALUE OF GRAVITY BASE: 978,933.7

CLASSIFICATION OF OBS.: Detail

TYPE ELEVATION: Spirit Leveling

YEAR OF OBSERVATION: 1961

ACCURACY OF OBSERVATIONS*: ±0.5 mgals

INSTRUMENT: Worden Master, 615 and 617

OBSERVER: Lt J. B. Schweninger and A2C Meyn

STATION NAME OR NO.	LATITUDE ° '	LONGITUDE ° '	ELEV. FT/~~MTRS~~	ESTIMATED ACCURACY ±	MEAN OBSERVED G MGAL
Keaau	19 38	155 02	328.12	1.0	978,858.9
Pahoa	19 30	154 57	674.84	"	851.6
Kalapana	19 22	154 58	10.81	"	867.0
Pohoiki	19 27	154 51	37.10	"	872.2
Pahala	19 12	155 28	1036	"	798.6
Hilea	19 08	155 32	302.41	"	846.4
Naalehu	19 03	155 36	673.86	"	817.2
Kealakekua	19 39	156 01	1371.75	"	773.9
Puuanahulu	19 48	155 51	2136	"	714.9
Auwaiakeakua Bridge	19 52	155 43	2522	"	722.9
Waikii	19 51	155 39	4732	"	601.0
USGS BM Hwy 2.8 miles S. of Mtn View	19 32	155 07	2120.07	"	757.6
Volcano House	19 26	155 16	3972.54	"	671.2
Hwy 11 USGS BM 3640	19 25	155 19	3640	1.0	688.4

REMARKS

1381 Form Feb 62 O-32 *Relative to Gravity Base Stations

PRINCIPAL FACTS FOR DETAIL OBSERVATIONS

COUNTRY USA - Hawaiian Islands

NAME OF GRAVITY BASE	VALUE OF GRAVITY BASE
Hickam MATS Terminal, Oahu	978,933.7

CLASSIFICATION OF OBS.	TYPE ELEVATION	YEAR OF OBSERVATION
Detail	Spirit Leveling	1961

ACCURACY OF OBSERVATIONS*	INSTRUMENT
±0.5 mgals	Worden Master, 615 and 617

OBSERVER
Lt J. B. Schweninger and A2C Meyn

STATION NAME OR NO.	LATITUDE ° ′	LONGITUDE ° ′	ELEV. FT/MTR	ESTIMATED ACCURACY ±	MEAN OBSERVED G MGAL
Makawao USGS BM	20 51.5	156 19	1638.73	1.0	978,811.0
Upper Paia USC&GS BM	20 54	156 22	165.54	〃	884.5
Kihei USC&GS BM	20 47	156 28	7.46	〃	896.2
Haleakala Crater	20 44.5	156 14	9324.81	〃	299.4
Haleakala USC&GS Trian. Station Kolekole	20 42.5	156 15.5	10012.0	〃	228.0
K-1 Bridge	21 57	159 28.1	641.24	〃	979,007.0
Kalahed USGS BM 700	21 55.5	159 31.8	700.13	〃	978,976.9
Port Allen USGS BM 35	21 54	159 35.3	35.24	〃	979,004.4
Waimea USGS BM 9	21 57.4	159 40.4	9.09	〃	021.0
Wailua Bridge	22 02.6	159 20.3	16.80	〃	061.0
Kapaa Armory	22 5	159 19	6.72	〃	058.0
Kahal Point Light House	21 08.8	159 18	24.42	〃	049.9
Koolau School	22 11.7	159 21	320	〃	044.2
Kilauea Tele. Exchange	22 12.2	159 24.6	320	〃	044.6
Hanalei Bridge BM 17	22 12.7	159 28.8	17.03	〃	070.0
Wainiha Power Hse BM101	22 11.8	159 33.5	100.29	〃	073.4
Kokee 109 AC&W Sta	22 09	159 38.5	4270	〃	978,767.8
Hwy 19 S. of Pepeekeo Jct	19 50	155 06	461.80	〃	868.6
Nanue Bridge	19 56	155 09	212.09	〃	900.6
Kilau Bridge	19 59	155 14	439.30	〃	884.6
Wapunahina Bridge	20 03	155 23	692.68	〃	877.4
Honokaa	20 05	155 28	1113.87	〃	857.0
Kukuihaele	20 08	155 34	730.06	〃	883.8
Waimea	20 03	155 45	3160.99	〃	740.8
Manukona Landing	20 11	155 59	11.33	〃	870.0
Halawa	20 13	155 42	263.68	〃	885.1
Makahuna Bridge	20 03	155 50	19.85	1.0	896.2

REMARKS

1381 Form Feb 62 0-32 *Relative to Gravity Base Stations

PRINCIPAL FACTS FOR DETAIL OBSERVATIONS

COUNTRY USA - Hawaiian Islands

NAME OF GRAVITY BASE: Hickam MATS Terminal, Oahu

VALUE OF GRAVITY BASE: 978,933.7

CLASSIFICATION OF OBS.: Detail

TYPE ELEVATION: Spirit Leveling

YEAR OF OBSERVATION: 1961

ACCURACY OF OBSERVATIONS*: ±0.5 mgals

INSTRUMENT: Worden Master, 615 and 617

OBSERVER: Lt J. B. Schweninger and A2C Meyn

STATION NAME OR NO.	LATITUDE °	′	LONGITUDE °	′	ELEV. FT/MTR	ESTIMATED ACCURACY ±	MEAN OBSERVED G MGAL
Kualapuu BM 878	21	02	157	09	877.92	1.0	978,916.4
Kalaupapa Lookout TBM	21	10.5	157	00	1613.5	↑	852.5
Kaunakakai USGS BM	21	05.5	157	01.5	4.83		958.9
Highway 45 Bridge	21	04	156	57	10.18		950.3
Kamalo USGS BM 39	21	03.5	156	52	39		949.7
Pukoo Fish Pond BM 2	21	04.5	156	48	7		953.2
Kanaha Pt USGS BM 48	21	07	156	44.5	48.82		955.4
Halawa USGS BM 25	21	09.5	156	44.5	25.97		962.8
Puu Nana Reservoir BM	21	09	157	10	1380.95		898.2
MaunaLoa USGS BM 1102	21	07.5	157	13	1102.53		905.8
Waieli Trian.Sta.	21	06.5	157	14.5	631		927.8
Kaeo Trian. Sta.	21	13	157	14	584		919.0
Kahakuloa USGS BM	21	00	156	33.5	203.39		896.0
Honokowai Hwy 30	20	57	156	41.5	19.0		904.0
Lahaina USGS BM	20	52.5	156	41	7.57		897.8
Olowalu Bridge	20	49	156	38	25.32		897.6
Intersec. Hwy 30 & 31	20	50	156	32	163		886.4
Wailuku Court House	20	53	156	30.5	331.06		882.4
Hwy37 Makena Jct Hwy31	20	40	156	24	1804.88		778.6
Kepuni Bridge	20	37.5	156	15.5	884		840.6
PuuManeoneo Trian.Sta.	20	38	156	10.3	3.56		871.1
Kipahulu USGS BM 192	20	39	156	04	191.52		899.2
Muolea USGS BM 335	20	41.3	156	01.5	335.48		905.6
Koolau Ditch Intake	20	49	156	08	1273.84		845.0
Nahiku USGS BM 44-M-1923	20	48.5	156	06	927.96		872.2
Kailua USGS BM M-11-1923	20	54	156	13.5	658.94	↓	869.6
Haiku USGS BM	20	55	156	19.5	512.45	1.0	877.6

REMARKS

1381 Form Feb 62 0-32 *Relative to Gravity Base Stations